SPECIAL PROVISIONS

Contents:

1. SCOPE OF WORK

This project includes improvements to both the Pee Wee Point North and Pee Wee Point South portions of the Tongue River Reservoir State Park. Improvements that are generally included in the Pee Wee Point South portion of the project include electrification of existing camp sites, addition of two host sites with full water, sewer, telephone and electrical service, road crossing conduits, landscaping rocks and two existing campsites converted to ADA accessible sites.

Pee Wee Point North improvements generally include expansion of the Boat Ramp Parking Area, water system improvement with a new 2000 gallon water storage cistern and jet pump, 2 new host sites with full water, sewer, telephone and electrical service, and a new campground loop with latrine and 2 ADA camp sites.

2. SAFETY STANDARDS

The Contractor shall be solely and completely responsible for conditions of the jobsite, including safety of all persons (including employees) and property during performance of the work. This requirement shall apply continuously and not be limited to normal working hours. Safety provisions shall conform to U.S. Department of Labor (OSHA), and all other applicable Federal, State, County, and Local laws, ordinances, codes and regulations. Where any of these are in conflict, the more stringent requirement shall be followed. The Contractor's failure to thoroughly familiarize himself with the aforementioned safety provisions shall not relieve him from compliance with the obligations and penalties set forth therein.

The Contractor shall develop and maintain for the duration of this Contract a safety program that will effectively incorporate and implement all required safety provisions. The Contractor shall appoint an employee who is qualified and authorized to supervise and enforce compliance with the safety program.

The duty of the Engineer to conduct construction review of the work does not include review or approval of the adequacy of the Contractor' safety program, safety supervisor, or any safety measures taken in, on or near the construction site.

The Contractor, as a part of his safety program, shall maintain at his office or other well-known place at the jobsites, safety equipment applicable to the work as prescribed by the aforementioned authorities, all articles necessary for giving first-aid to the injured, and shall establish the procedure for the immediate removal to a hospital or a doctor's care of persons (including employees) who may be injured on the jobsite.

If death or serious injuries or serious damages are caused, the accident shall be reported immediately by telephone or messenger to both the Engineer and the Owner. In addition, the Contractor must promptly report in writing to the Engineer all accidents whatsoever arising out of, or in connection with, the performance of the work whether on, or adjacent to, the site, giving full detail and statements of witnesses.

If a claim is made by anyone against the Contractor or any subcontractor on account of any accident, the Contractor shall promptly report the facts in writing to the Engineer, giving full details of the claim.

The Contractor shall take all necessary provisions for safe handling of chemical amendments and potentially hazardous wastes, including apprising himself of hazards, developing safety plans, providing emergency and decontamination services, and developing spill containment procedures.

3. PROJECT MEETINGS

Pre-Construction Conference. After the Contract has been awarded, but before the start of construction, a pre-construction conference will be held at a time and place mutually agreed to by the parties. The conference shall be attended by the following: the Contractor and his superintendent; the principal subcontractors; representatives of principal suppliers and manufacturers, as appropriate; the Engineers and his construction observer; representatives of the Owner and others as appropriate.

Unless previously submitted, the Contractor shall bring the following submittals to the conference: list of proposed Subcontractors; proposed construction schedule; schedule for submitting shop drawings and other submittals; schedule procurement dates; construction technique submittal forms (as applicable); preliminary payment schedule; and tentative schedule of values. Work shall not start prior to the Engineer's receipt of these submittals. The Engineer will preside at the conference and will arrange for keeping the minutes and distributing copies of the minutes to all persons attending the meeting.

4. UTILITIES AND BARRIERS

Notification. The Contractor shall contact the one call locate number in advance of performing any excavation work on the site to obtain utility locates over the entire area to be impacted by construction of the project. The Contractor shall immediately notify the Engineer of the discovery of any utilities that are in conflict with the work that were not previously identified in the plans.

Identification. All utilities that may conflict with the work shall be the Contractor' responsibility To locate before any excavation is performed. Field markings provided by the utilities shall be preserved by the Contractor until actual excavation commences. All utility locations on the Drawings should be considered approximate and should be verified in the field by the Contractor. The Contractor shall also be responsible for locating all utilities that are not located on the Drawings.

Temporary Utilities. The Contractor shall provide all temporary electrical, lighting, telephone, heating, cooling, ventilating, water, sanitary, first aid, fire protection, and other utilities and services necessary for the performance of the work. All fees, charges, and other costs associated therewith shall be paid for by the Contractor.

Conflicts with Existing Utilities. For any utilities shown on the plans which are damaged or require temporary support to allow performance of the work, the Contractor shall contact the utility's owner and make all arrangements and pay all costs associated with the repair and/or temporary support of the utility. The Contractor shall comply with all requirements of the utility's owner.

The Contractor is responsible for the repair of any utilities that were properly marked by the utility locator and damaged by the Contractor, whether they are shown on the plans or not.

Barriers. The Contractor shall temporarily remove all fences, barricades, minor structures, and other obstructions that interfere with the prosecution of the work. Removal shall not extend beyond designated construction limits or right-of-way without first obtaining written authorization from the owner of the barrier.

Fences and barricades used for the confinement or exclusion of livestock, animals, or persons shall be replaced at the end of each work day to the extent necessary to perform the restrictive intent of the barrier.

Unless otherwise directed by the Engineer or indicated on the Drawings, all barriers so removed shall be replaced following the completion of the work to as good or better condition than existed prior to the start of work. The requirement applies to small trees and decorative shrubs as well as fences, barricades, and minor structures.

The Contractor shall replace at his own expense all barriers damaged or destroyed.

5. REPAIR AND REPLACEMENT QUALITY

General. Items requiring repair or replacement due to damage or removal or otherwise necessitated in the course of pursuance of the work and which are not otherwise specified herein, shall be repaired or replaced to the following levels of quality.

Paved and Gravel Roads, Driveways, and Sidewalks. Repair or replacement shall be to a thickness and grade matching the existing condition. Quality of materials and methods shall comply with respective sections of the current edition of the Montana Public Works Standard Specifications.

Water and Sewer Main and Services. Repair or replacement shall be in a manner consistent with the existing condition using materials conforming to the Uniform Plumbing Code, the current editions of the DEQ 1 and DEQ 2 circulars, American Water Works Association Standard Specifications, and the requirements of the Montana Department of Environmental Quality. Construction shall also comply with the current edition of the Montana Public Works Standard Specifications. Repair or replacement will not be allowed with materials like the existing installation if they do not conform to the above-referenced standards.

Electrical, Telephone, Cable TV, Natural Gas, and Petroleum Lines. Repair or replacement shall be to the standards required by the utility owner and at the utility owner's option may be performed by the utility owner with full cost assessed to the Contractor.

Fences. All fences adjacent to any work site are to be maintained to the satisfaction of the abutting property owners. The Contractor shall notify the landowners of the need to temporarily removed or relocate fences for access to the work and shall coordinate such activities with the respective landowners in regards to removal, relocation, and restoration of fences prior to commencing work.

Any fence removed or destroyed during the course of the Contract shall be reinstalled or reconstructed in like kind at no cost to the Owner or the landowner. The cost for this work shall be considered incidental and no additional compensation will be allowed.

Other Items. Repair or replacement of other items not covered by the preceding shall be to the standards required by the owner of the item and at the owner's option may be performed by the owner of the item with full cost assessed to the Contractor.

Decisions Regarding Repair Versus Replacement. The decision of repair versus replacement of an affected item shall be at the discretion of the Engineer upon consultation with the owner of the item. The decision shall be based on a determination of whether repaired quality can equal the quality of a replacement installation. The Engineer's authority shall be final in this regard.

Limits of Repair and Replacement. The limits of areas to be repaired or replaced shall be determined by the Engineer in the field based on the extent of damage or removal sustained. The

determination shall be based on insuring that all damaged or removed portions of the existing installation are fully restored. The authority of the Engineer shall be final in this regard. All work effects outside limits as described in these Contract Documents are subject to repair and replacement quality as described herein.

Repair by Party Owning or Maintaining Item. The party owning or maintaining the item under consideration shall have the exclusive right to undertake repair or replacement themselves and charge the Contractor for full costs incurred or to direct and supervise the Contractor to repair or replace the item to their standard of quality. The authority of the owner of the item shall be final in this regard.

6. GENERAL CONSTRUCTION REQUIREMENTS

Quality Assurance. The Engineer will monitor the construction of work covered by this section to determine if the work is being performed in accordance with the contract requirements. The Engineer does not have the authority or the means to control the Contractor's methods of construction. It is, therefore, the Contractor' responsibility to utilize all methods, equipment, manpower, and other means necessary to assure that the work is installed in compliance with the Drawings and Specifications, and laws and regulations applicable to the work. All buried work items shall be installed in the presence of the Engineer or may not be considered for payment.

Grade and Alignment. The Contractor shall provide all construction staking as required to define the locations of the roadway, building, retaining wall and underground utilities to be installed under this contract.

Tolerances. Construction tolerances for the work shall be as outlined in the Technical Specifications.

Construction Limits. The limit shall be limited to 50 feet from any edge of excavation and embankment, pipe, or any other improvements shown on the plans. Otherwise all equipment access is allowed along existing roads. Disturbance and equipment access beyond this limit is not allowed without the written approval of both the Engineer and the owner of the affected property. If so approved, disturbance beyond construction limits shall meet all requirements imposed by the landowner; this includes existing roads used and/or improved as well as the construction of new access roads. Special construction, reclamation, or post-construction road ripping or other closure provisions required by the landowner on access roads beyond the construction limits shall be performed by the Contractor at no additional cost to the Owner.

Areas of Disturbance. Approved areas of disturbance are those areas disturbed by construction activities within the construction limits and along designated or approved access routes. Such areas shall be fine graded to blend with the existing terrain. Other areas that are disturbed by the Contractor's activities outside the limits noted above will be considered as site damage or unapproved areas of disturbance subject to the repair and replacement quality as specified herein. Such areas will also require the reclamation operations noted above and as specified herein, but costs of such work shall be borne by the Contractor. This includes areas selected by the

Contractor outside the defined construction limits for mobilization, offices, equipment, or material storage.

7. ENGINEERING INTERPRETATIONS

Engineering Decisions. It is realized that timely engineering decisions on construction activities or results have an important bearing on the Contractor's schedule. On this project, the Engineer will make every effort to have a Project Inspector readily available to the project during the construction schedule, who has the authority to make judgement calls on matters dealing with interpretation of the plans and specifications, with one qualification: that he shall have the right to take twenty-four (24) hours to confer with other Engineers before giving said decision.

When the decision affects a plan design or specification change, it should be realized that more time may be required than twenty-four (24) hours to gain the necessary Owner and funding source participation in the decision process including time for formal change order preparation as required.

8. REJECTED WORK

Any defective work or nonconforming materials or equipment that may be discovered at any time prior to the expiration on the warranty periods shall be removed and replaced by work which shall conform to the provisions of the Contract Documents. Any material condemned or rejected shall be removed at once from the project site. Failure on the part of the Engineer to condemn or reject bad or inferior work or to note nonconforming materials or equipment on Contractor's submittals shall not be construed to imply acceptance of such work. The Owner shall reserve and retain all its rights and remedies at law against Contractor and its Surety for correction of any and all latent defects discovered after the guarantee period.

The Engineer will have the authority to reject work that does not conform to the Contract Documents and will provide the Owner with a list of defective work and nonconforming materials of equipment. The Owner will then promptly provide the Contractor with the list of defective work and nonconforming materials or equipment.

9. QUALITY CONTROL

Scope. All work will be tested and inspected to insure compliance with the Contract Documents. Complete payment will not be made until the Contractor has demonstrated that the work is complete and will perform as required.

Performance of Tests and Inspections. The Contractor, Owner, Engineer, and representatives of funding and regulatory agencies will perform periodic inspections and tests to determine compliance with the Contract Documents. The Contractor shall provide qualified manufacturer's representation during tests of equipment and special procedures as required by the Contract Documents.

Notification. The Contractor shall provide the Engineer with a written schedule indicating dates for specific testing and inspection services to be performed. The schedule shall be updated as required to give the Engineer at least a week's advance notice. The Contractor shall notify the Engineer immediately of any change or shall be subject to pay engineering fees as herein described.

Inspection. The Contractor shall inspect the work as it is being performed. Any deviation from the requirements shall be immediately corrected. Prior to any scheduled inspection by the Engineer, the Contractor shall again inspect the work and certify to the Engineer that he has inspected the work and it meets the requirements of the Contract Documents.

The Engineer's representative will observe work and compare the quality of the work with the requirements of the Contract Documents. Any discrepancies noted shall be brought to the Contractor's attention, who shall immediately correct the discrepancy. Failure of the Engineer to detect a discrepancy will not relieve the Contractor of his ultimate responsibility to perform the work as required.

Should the Engineer incur additional costs to make additional observation as a result of unacceptable work, the Contractor shall reimburse the Owner for additional engineering fees at the Engineer's rates at the time.

Observation by the Engineer's representative shall not be considered as authorization to proceed with the work. Work progress and the performance of quality work are the Contractor's responsibility. The Engineer's observation is for the purpose of determining what work will be paid for and what work will not be paid for. If the Engineer detects a discrepancy between the work and the requirement of the Contract Documents at any time, up to and including final inspection, such work will not be completely paid for until the Contractor has corrected the deficiency.

The work will be subject to review by the Owner and funding agency representatives whose findings shall be as valid as those of the Engineer. The results of all such observations shall be directed to the Contractor through the Engineer.

Equipment and System Tests. The Contractor shall provide all equipment, materials, supplies, manufacturer's representation, and incidentals necessary to perform tests on completed work. The Contractor shall notify the Engineer, in advance, when, where, and on what portion of the work a test will be performed and shall perform the test in the presence of the Engineer. The Engineer's presence during the test will not relieve the Contractor of his responsibility to provide equipment and systems meeting all the requirements of the Contract Documents and to warrant the work as required.

Should any tests performed in the presence of the Engineer fail to meet the requirements of the Contract Documents or should the Contractor fail to provide adequate notice of a change in scheduling tests, the Contractor shall reimburse the Owner for additional engineering fees resulting there from.

10. CONSTRUCTION SURVEYS

Construction surveying shall be provided by the Contractor.

11. FIELD ENGINEERING

Engineering Services Provided by the Owner. The Owner shall provide the following engineering services at no cost to the Contractor except as required for certain tests and retests as defined in the Contract Documents.

Review of submittals and shop drawings as defined in the Specifications.

Periodic inspections by the Engineer and its representative(s) as deemed appropriate by the Owner and Engineer.

Independent Services Provided by the Contractor. The Contractor shall provide the following services at no additional cost to the Owner.

Field Density Testing of materials as required per the Technical Specifications. Testing shall be provided by a certified independent testing laboratory. Testing frequencies shall be as follows:

Water and Sewer Trench Backfill – 1 test per lift for each 300 feet of trench
Water Cistern Backfill – total of 4 tests
Electrical Trench Backfill – 1 test per lift for each 500 feet of trench
Excavation and Embankment – total of 30 tests
Crushed Base Course – 1 test per 400 sy of Crushed Base Course
Sub Base Course - 1 test per 400 sy of Sub Base Course
Crushed Top Surfacing – 1 test per 500 sy of Crushed Top Surface

Preparation and certification of all required shop drawings and submittals.

Performance of certain tests as required by the Contract Documents.

Maintenance of project drawings, accurately marked up with changes.

Design of all temporary construction falsework, bracing, shoring, support, or other structural work necessary for the permanence of the work.

Engineering Services Paid for by the Contractor. The Contractor is advised that certain engineering services required by the Contract Documents will be performed by the Engineer and paid for by the Contractor.

In general, these services include retests by the Engineer of tests that have failed, repeated review of submittals and shop drawings that have not been approved, and other services that are within the Contractor's control to avoid.

Payment of engineering services shall be made by invoice to the Contractor or deducted from partial payments, whichever is necessary.

12. WEATHER DAYS

Weather Days. In the event inclement weather or the aftermath of inclement weather prevents the Contractor from performing the sequence of operations that should be in progress at that time for a minimum of 60% of the normal daily schedule being worked, he may request a time credit for that day. No credit for inclement weather will be allowed on non-working days (Saturday, Sunday, and Holidays).

Determination of the number of credit days will be made between the Contractor and the Engineer at the end of each calendar month.

13. MATERIAL SOURCES

If additional material is needed trench backfill, embankment or other materials, the Contractor will be responsible for placement and import from a designated on site location. If the material excavated for the trench meets the required specifications, it may be used and installed per specifications. Topsoil shall be stripped, stockpiled and replaced per specifications over disturbed areas. Supplemental topsoil may be imported at the discretion of the Owner/ Engineer.

If excess material is generated during construction, it shall be exported and disposed of in an on-site location designated by the Owner.

All areas utilized for material sources or excess material shall be fine graded to blend with existing terrain, topsoiled and reseeded. Haul routes shall be within the corridors of disturbance created by this project.

14. ENVIRONMENTAL PROTECTION

The Contractor shall comply with all laws and regulations of the United States Corps of Engineers and Environmental Protection Agency, Montana Department of Fish, Wildlife and Parks, Department of State Lands, Department of Environmental Quality, the Department of Natural Resources and Conservation, and with all other Federal, State, and Local laws and regulations controlling pollution of the environment. He shall take necessary precautions to prevent pollution of streams, lakes, ponds, and reservoirs with fuels, oils, bitumens, chemicals, or other harmful materials and to prevent pollution of the atmosphere from particulate and gaseous matter.

The Contractor also agrees to comply with the requirements of any permits obtained for the project by the Owner. These permits include but may not be limited to the permits listed under

the Permits and Regulatory Requirements section. Copies of any of these permits are available upon request from the Engineer.

The Contractor shall be responsible for submitting and obtaining a temporary discharge permit from the Montana Department of Environmental Quality for the discharge of any water related to the construction of this project. A construction Dewatering Discharge Permit, issued by the Department of Environmental Quality, is required if water from construction is discharged to state waters. The Department of Environmental Quality must be contacted immediately if either contaminated soil or contaminated groundwater is encountered.

The Contractor shall be responsible for submitting and obtaining a storm water discharge permit from the Montana Department of Environment Quality. The cost of any erosion control measures or other work required by the permit shall be included in the bid and are considered incidental to the project.

15. WEED CONTROL

Prior to mobilizing equipment to the project site, the Contractor shall clean his equipment and vehicles to assure no weeds are imported. If there is an abnormal growth of noxious weeds on a project site after construction as determined by the Owner or local weed control authority, the Contractor may be responsible for weed control under the contract warranty.

16. PERMITS AND REGULATORY REQUIREMENTS

Jurisdiction. The performance of this work shall be under the jurisdiction of the following agencies, departments, and standards and compliance with the requirements thereof is required:

Federal Level: United States Law

State Level: Department of Environmental Quality; Department of Fish, Wildlife & Parks; Montana Department of Transportation; Montana Building Code Division; Uniform Building Code; Uniform Plumbing Code; Uniform Mechanical Code; National Electric Code; State annotations to these codes; and Montana State Law.

Local Level: Bighorn County

Contractor's Responsibility. The Contractor shall familiarize himself with the requirements of all regulatory agencies pertaining to the performance of the work on the project.

The Contractor shall secure and pay for all permits, licenses, and fees necessary for the performance of the work.

The Contractor shall perform all work in accordance with the regulatory requirements. Any conflict between the Contract Documents and the regulatory requirements shall be brought to the immediate attention of the Engineer.

The following permits will be required for construction:

Permit	Entity Providing Permit	Entity Submitting Permit
SWPPP	MDEQ	Contractor
Wastewater System	Bighorn County	Owner
Water System	MDEQ	Owner
Floodplain Permit	Bighorn County	Owner

17. SMOKE AND DUST CONTROL

The Contractor shall have informed himself of all applicable State Board of Health requirements and similar State or Federal requirements pertaining to control of or abatement of air pollution. The Contractor shall have provided or be prepared to provide such air pollution control measures as are required to comply with the minimum standards established by such agencies.

Hauling of material and transport of equipment along public roadways or through the towns and adjacent other structures and dwellings shall require effective dust abatement procedures. This also applies to the unloading and placement of spoils material at deposition sites. The Contractor shall utilize environmentally sound methods for watering and/or otherwise chemically treating dust-generating surfaces to comply with all applicable legal standards for airborne particulates. Prior to any work, the Contractor shall submit a written plan for dust abatement procedures identifying at a minimum the following:

- Times and nature of dust generating activity on public roads and at deposition sites.
- Nature and chemical characterization of dust abatement materials to be used.
- Method of application of dust abatement materials to be used.
- Time schedule for application of dust abatement materials to be used.
- Availability of equipment and operators for emergency application of dust abatement materials at other than scheduled times.

Watering for dust control is considered incidental to the Contract and shall be performed at no additional cost to the Owner.

18. USE OF COMPLETED PORTIONS

The Owner shall have the right to take possession of and use any completed or partially completed portions of the work, notwithstanding that the time for completing the entire work or such portions may not have expired; but such taking possession and use shall not be deemed an acceptance of any work not completed. If such taking possession and use of incomplete work causes refinishing of completed work, the Contractor shall be entitled to such extra compensation or extension of time or both, as agreed by the Owner.

19. WARRANTY

The Contractor shall warranty all materials and equipment furnished and work performed for a period of one year from the date of final city acceptance. The Contractor warrants and guarantees for a period of one year from the date of final acceptance of the project that the project is free of all defects due to faulty material or workmanship and the Contractor shall promptly make such corrections as necessary by reason of such defects including repair or damage to other parts of the project resulting from such defects. The Owner will give notice of observed defects with reasonable promptness. In the event the Contractor should fail to make such repairs, adjustments, or other work that may be made necessary by such defects, the Owner may repair the defects and charge the Contractor the cost thereby incurred. The performance bond shall remain in full force for a period of one year after final acceptance.

20. CONTRACT DOCUMENT DISCREPANCIES

In the event that a provision of the Contract Documents conflicts with any other provision the Contract Documents, the provision in that Contract Document first listed below shall govern, except as otherwise specifically stated:

- Agreement
- Addenda to Contract Documents
- Performance and Labor and Materials Bond
- Proposal (bid)
- Bid Security
- Bid Provisions
- Invitation to Bid
- Instructions to Bidders
- Drawings
- Special Provisions
- Technical Specifications
- Supplementary Conditions
- General Conditions

21. SITE CLEANUP

Before final acceptance is made, the entire work area shall be cleaned and conditioned. This shall consist of the following:

- Grease, oil, grit, dirt, grime, debris, and other foreign materials shall be removed;
- Nicks, scratches, voids, holidays, and other imperfections in painted surfaces shall be touch-up painted with matching paint;

- Chips, voids, cracks, and other imperfections in exposed concrete shall be repaired with methods and materials approved by the Engineer;
- Threaded fasteners shall be checked for tightness;
- Doors, windows, hatches, and other mating surfaces shall be adjusted to fit square in their respective framework;
- Driveways and parking areas shall be fine-graded; and
- Landscaping shall be fine-graded.

At the completion of this Contract, before acceptance of the work by the Owner, the Contractor shall remove all of his equipment, tools, and supplies from the property of the Owner. Should the Contractor fail to remove such equipment, tools, and supplies, the Owner shall have the right to remove them at the Contractor's expense and deduct all resulting costs from the final payment.

22. SANITARY FACILITIES

Sanitary facilities shall be provided and maintained by the Contractor who will comply with state and local regulations. The cost of furnishing, installing, and maintaining sanitary facilities shall be considered incidental to other items of work and no additional compensation will be allowed.

23. MEASUREMENT AND PAYMENT

A. **Scope:** This section describes the method of measurements and the basis of payment for all work shown on the drawings and required by the Contract Documents. This measurement and payment section shall take precedence over all other references to measurement and payment referenced in these specifications (with the exception of any addenda).

B. **Bid Prices:** The bid price for each item of the Contract in the Bid Proposal shall cover all work shown on the drawings and be defined in the specifications and other contract documents. All costs in connection with the work including furnishing all materials, equipment, and tools, and performing all necessary labor and supervision to fully complete the work, shall be included in the lump sum or unit price bid items on the proposal. The amounts shown on the proposal shall be the contract price.

No item that is required by the Contract Documents for the proper and successful completion of the work will be paid for outside of or in addition to the prices submitted in the Bid Proposal. All work not specifically set forth as a pay item in the Bid Proposal shall be considered a subsidiary obligation of the Contractor and all cost in connection therewith shall be included in the prices bid.

Retainage at the amounts specified in the General Conditions will be withheld from each progress payment.

C. **Estimated Quantities:** Any estimated quantities stipulated in the Bid Proposal or other Contract Documents are approximate and are to be used only as a basis for

estimating probable cost of the work and for the purpose of comparing the bids submitted for the work.

D. **Method of Measurement:** No measurement will be made on bid items representing a lump sum bid.

E. **Basis of Payment:**

1. Mobilization, Insurance & Bonding

- General: This bid item shall include the costs associated with mobilizing to the project site, insurance, permitting, and submittals.

- Work Included:

  - All labor, tools, equipment, materials, royalties, and incidentals needed to complete the work as specified;
  - Transport and set up all equipment, materials, and other items needed to complete the project;
  - All permits, coordination, and compliance inspections required for the work;
  - Insurance;
  - Prepare and provide submittals, construction schedule, and all other paperwork required by the contract documents prior to construction startup.

- Measurement: Measurement shall be one lump sum bid item.

- Payment: Payment shall be by the price bid for the lump sum bid item listed in the proposal.

2. Site Excavation, Embankment and Grading

- General: This bid item shall include the excavation, embankment, grading and subgrade preparation for the campground road, camp pads and new parking areas and general site grading.

- Work Included:
  - All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
  - Clearing and grubbing;
  - Grading, embankment, excavation and compaction;
  - Import or export of material to on-site barrow and or wasting areas;
  - Compaction testing;

- Survey;
- Watering and dust control;
- Remove and replace existing topsoil.

- Measurement: Measurement shall be one lump sum bid item.

- Payment: Payment shall be by the price bid for the lump sum bid item listed in the proposal.

3. New Camp Pad Subgrade Preparation

- General: This bid item shall include the excavation and subgrade preparation for camp pads.

- Work Included:
  - All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
  - Grading, embankment, excavation and compaction;
  - Import or export of material to on-site barrow and or wasting areas;
  - Compaction testing;
  - Survey;
  - Watering and dust control;
  - Remove and stockpile existing topsoil.

- Measurement: Measurement shall be per square yard of camp pad subgrade prepared. Measurement shall be rounded to the nearest square yard.

- Payment: Payment shall be by the unit price bid for each square yard of camp pad subgrade prepared listed in the proposal.

4. Demolition

- General: This bid item shall include all demolition for the Pee Wee North site as defined in the drawings.

- Work Included:
  - All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
  - Grading, embankment, excavation and compaction as needed to remove existing items;
  - Transport, disposal and/or salvage of existing material and equipment;
  - Storage of items that are identified for reuse;

- Import and compaction of materials to fill voids left by buried materials that are removed.

- Measurement: Measurement shall be one lump sum bid item.

- Payment: Payment shall be by the price bid for the lump sum bid item listed in the proposal.

5. Salvage and Stockpile Existing Gravel

- General: This bid item shall include the removal and stockpile of existing gravel in areas identified in the drawings.

- Work Included:
  - All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
  - Excavation and loading of gravel;
  - Maintain separation between crushed top surfacing and crushed base course;
  - Transport to stockpile area.

- Measurement: Measurement shall be per cubic yard of existing gravel salvaged and stockpiled. Measurement shall be rounded to the nearest cubic yard.

- Payment: Payment shall be by the unit price bid for each cubic yard of existing gravel salvaged and stockpiled listed in the proposal.

6. Existing Road and Parking Areas Crushed Top Surfacing

- General: This bid item shall include the preparation for and placement of imported crushed top surfacing on areas with existing gravel already in place.

- Work Included:
  - All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
  - Grading, compaction and preparation of surfaces to be graveled;
  - Provide, place and compact crushed top surfacing;
  - Compaction testing;
  - Survey as needed;
  - Watering and dust control;
  - Fine grading.

- Measurement: Measurement shall be per square yard of crushed top surfacing installed. Measurement shall be rounded to the nearest square yard.

- Payment: Payment shall be by the unit price bid for each square yard of crushed top surfacing installed listed in the proposal.

7. Remove and Replace Gravel Road Surfacing

- General: This bid item shall include the removal and replacement of the gravel surfacing section where new conduits, piping and electrical conductors are being installed through existing road surfacing and camp pad surfacing.

- Work Included:
  - All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
  - Removal of existing gravel material;
  - Replace and compact existing gravel material;
  - Import additional gravel as necessary to repair road.
  - Compaction testing;
  - Watering and dust control;
  - Fine grading.

- Measurement: Measurement shall be per lineal foot of gravel road surfacing removed and replaced. Measurement shall be to the nearest foot as measured along pipe or conductors being installed.

- Payment: Payment shall be by the unit price bid per lineal foot of gravel road surfacing removed and replaced listed in the proposal.

8. New Camp Pad Gravel Section

- General: This bid item shall include the placement of the gravel section for camp pads.

- Work Included:
  - All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
  - Import, place and compact sub base course;
  - Import, place and compact crushed top surfacing;
  - Compaction testing;
  - Survey;
  - Watering and dust control;
  - Fine grading.

- Measurement: Measurement shall be per square yard of new camp pad gravel section installed. Measurement shall be rounded to the nearest square yard.

- Payment: Payment shall be by the unit price bid for each square yard of new camp pad gravel section installed listed in the proposal.

9. New Road and Parking Area Gravel Section

- General: This bid item shall include the placement of the gravel section for the campground road and new parking areas.

- Work Included:
  - All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
  - Import, place and compact sub base course;
  - Import, place and compact crushed top surfacing;
  - Compaction testing;
  - Survey;
  - Watering and dust control;
  - Fine grading.

- Measurement: Measurement shall be per square yard of new road and parking area gravel section installed. Measurement shall be rounded to the nearest square yard.

- Payment: Payment shall be by the unit price bid for each square yard of new road and parking area gravel section installed listed in the proposal.

10. Resurface Camping Area with Salvaged Crushed Top Surfacing

- General: This bid item shall include the preparation for and placement of salvaged crushed top surfacing on areas with existing gravel already in place.

- Work Included:
  - All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
  - Grading, compaction and preparation of surfaces to be graveled;
  - Placement and compaction of salvaged crushed top surfacing;
  - Compaction testing;
  - Survey as needed;

- Watering and dust control;
- Fine grading.

- Measurement: Measurement shall be per square yard of crushed top surfacing installed. Measurement shall be rounded to the nearest square yard.

- Payment: Payment shall be by the unit price bid for each square yard of crushed top surfacing installed listed in the proposal.

11. New Gravel Path Section

- General: This bid item shall include the placement of the gravel section for the new path.

- Work Included:
  - All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
  - Import, place and compact sub base course;
  - Import, place and compact crushed top surfacing;
  - Compaction testing;
  - Survey;
  - Watering and dust control;
  - Fine grading.

- Measurement: Measurement shall be per square yard of new gravel path installed. Measurement shall be rounded to the nearest square yard.

- Payment: Payment shall be by the unit price bid for each square yard of new gravel path installed listed in the proposal.

12. ADA Camp Pad

- General: This bid item shall include the installation of ADA Camp Pads.

- Work Included:
  - All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
  - Grading, embankment, excavation and compaction to prepare subgrade;
  - Survey as required to locate the pad;
  - Provide and place geotextiles as required;

- Import and place crushed base course including compaction;
- Place forms (if used);
- Provide and place reinforcing
- Provide and place concrete including reinforcing and finishing as required;
- Provide and place gravel near fire pit;
- Paint concrete curb stop blue;
- Grading and embankment adjacent to ADA pad.

◆ Measurement: Measurement shall be per each ADA camp pad installed.

◆ Payment: Payment shall be by the unit price bid for each ADA camp pad installed listed in the proposal.

13. Handicapped Sign

◆ General: This bid item shall include the installation of new Handicapped Parking signs

◆ Work Included:
- All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
- Provide and install sign posts;
- Survey as required to locate signs;
- Provide and secure sign to posts;
- Fine grading of disturbed area.

◆ Measurement: Measurement shall be per each handicapped sign installed.

◆ Payment: Payment shall be by the unit price bid for each handicapped sign installed listed in the proposal.

14. New Concrete Curb Stop

◆ General: This bid item shall include the placement of new concrete curb stops.

◆ Work Included:
- All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
- Provide and place curb stop;
- Provide and install rebar and rebar end caps;

- Any modifications to the curb stop necessary for installation;
- Survey as necessary.

- Measurement: Measurement shall be per each new concrete curb stop installed.

- Payment: Payment shall be by the unit price bid for each new concrete curb stop installed listed in the proposal.

15. Remove and Reset Concrete Curb Stop

- General: This bid item shall include the removal and placement of existing concrete curb stops.

- Work Included:
  - All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
  - Remove, store, transport and place salvaged curb stop;
  - Provide and install rebar and rebar end caps;
  - Any modifications to the curb stop necessary for installation;
  - Survey as necessary.

- Measurement: Measurement shall be per each concrete curb stop removed and reset.

- Payment: Payment shall be by the unit price bid for each concrete curb stop removed and reset listed in the proposal.

16. Remove and Reset Picnic Table

- General: This bid item shall include the removal and placement of existing picnic tables.

- Work Included:
  - All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
  - Remove, store, transport and place salvaged picnic tables.

- Measurement: Measurement shall be per each picnic table removed and reset.

- Payment: Payment shall be by the unit price bid for each picnic table removed and reset listed in the proposal.

17. Remove and Reset Fire Pit

- General: This bid item shall include the removal and placement of existing fire pits.

- Work Included:
  - All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
  - Remove, store, transport and place salvaged fire pits.

- Measurement: Measurement shall be per each fire pit removed and reset.

- Payment: Payment shall be by the unit price bid for each fire pit removed and reset listed in the proposal.

18. Remove and Reset Sign

- General: This bid item shall include the removal and placement of existing signs.

- Work Included:
  - All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
  - Remove, store, transport and reset signs.
  - Provide new posts and components as necessary to replace sign;
  - Replace sign foundations to match existing signs.

- Measurement: Measurement shall be per each sign removed and reset.

- Payment: Payment shall be by the unit price bid for each sign removed and reset listed in the proposal.

19. New Picnic Table

- General: This bid item shall include the placement of new picnic tables.

- Work Included:
  - All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
  - Provide and install table anchoring system;
  - Provide and place new picnic tables.

- Measurement: Measurement shall be per each picnic table installed.

- Payment: Payment shall be by the unit price bid for each picnic table installed as listed in the proposal.

20. New Fire Pit

- General: This bid item shall include the placement of new fire pits.

- Work Included:
  - All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
  - Provide and install poured in place foundations;
  - Provide and place new fire pits.

- Measurement: Measurement shall be per each fire pit set.

- Payment: Payment shall be by the unit price bid for each fire pit set listed in the proposal.

21. New ADA Fire Pit

- General: This bid item shall include the placement of new ADA fire pits.

- Work Included:
  - All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
  - Provide and install poured in place foundations;
  - Provide and place gravel for inside fire ring;
  - Provide and place new fire pits.

- Measurement: Measurement shall be per each ADA fire pit set.

- Payment: Payment shall be by the unit price bid for each ADA fire pit set listed in the proposal.

22. Barrier Rocks

- General: This bid item shall include providing and placing of barrier rocks.

- Work Included:

- All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
- Provide and place rocks;
- Excavation and embankment;
- Gravel surfacing repair,
- Survey.

- Measurement: Measurement shall be per each rock placed.

- Payment: Payment shall be by the unit price bid for each rock placed listed in the proposal.

23. 2000 gallon FRP Cistern

- General: This bid item shall include providing and installing a 2000 gallon FRP Water storage cistern including piping connections and appurtenances.

- Work Included:
  - All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
  - Excavation, backfill, compaction;
  - Provide and place tank including all appurtenances;
  - Piping connections to connection points with existing piping or the pump building foundation;
  - Vent inlet and outlet piping;
  - Foot valve;
  - Tank fill line;
  - Submersible level transmitter,
  - Relocate power to existing well;
  - Fine grading;
  - Blue board insulation;
  - Concrete deadmen and straps;
  - Manway, hatch and pipe penetrations.

- Measurement: Measurement shall be one lump sum bid item.

- Payment: Payment shall be by the price bid for the lump sum bid item listed in the proposal.

24. Pump Building Modifications

- General: This bid item shall include modifications to the existing pump building to install a new jet pump.

- Work Included:

- All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
- Demolition of existing piping and appurtenances;
- Provide and install jet pump;
- Provide and install piping, fittings and valves within building lines;
- Provide and install jet pump controls;
- Provide and install new existing well pump controls;
- Provide and install pump support pad.

◆ Measurement: Measurement shall be one lump sum bid item.

◆ Payment: Payment shall be by the price bid for the lump sum bid item listed in the proposal.

25. 1" HDPE Water Piping

◆ General: This bid item shall include the installation of water supply piping.

◆ Work Included:
- All labor, tools, equipment, materials, royalties, and incidentals needed to complete the work as specified;
- Connection to existing pipe;
- Utility bracing/support and coordination with Utility Owners;
- Disposal of existing pipe and appurtenances as required;
- Provide compaction testing from an independent testing firm;
- Clearing and grubbing;
- Survey as required to maintain alignment and grade;
- Repair and replacement of any items not specifically mentioned elsewhere in these specifications;
- Trench excavation and backfill;
- All gaskets and appurtenances required to make pipe connections;
- Type 1 bedding;
- Type 2 bedding;
- Exploratory excavation and existing utility crossings;
- Remove spoils generated by pipe installation;
- Provide and install pipe;
- Required testing of pipe;
- Fine grading of disturbed area.

- Measurement: Measurement shall be per lineal foot of pipe installed including fittings and valves. Measurement shall be to the nearest foot.

- Payment: Payment shall be by the unit price bid per lineal foot of pipe listed in the proposal.

26. 1" Curb Valve

- General: This bid item shall include providing and installing a buried curb valve.

- Work Included:
  - All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
  - Connections to pipe;
  - Utility bracing/support and coordination with Utility Owners;
  - Disposal of existing pipe and appurtenances as required;
  - Provide compaction testing from an independent testing firm;
  - Clearing and grubbing;
  - Survey as required to maintain alignment and grade;
  - Repair and replacement of any items not specifically mentioned elsewhere in these specifications;
  - Trench excavation and backfill;
  - All gaskets and appurtenances required to make pipe connections;
  - Type 1 bedding;
  - Type 2 bedding;
  - Exploratory excavation and existing utility crossings;
  - Remove spoils generated by pipe installation;
  - Provide and install valve;
  - Required testing of valve;
  - Fine grading of disturbed area.

- Measurement: Measurement shall be per each curb valve installed.

- Payment: Payment shall be by the unit price bid for each curb valve installed listed in the proposal.

27. 1" Stop/Drain Valve

- General: This bid item shall include providing and installing a buried stop/drain valve.

- Work Included:

- All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
- Connections to pipe;
- Utility bracing/support and coordination with Utility Owners;
- Disposal of existing pipe and appurtenances as required;
- Provide compaction testing from an independent testing firm;
- Clearing and grubbing;
- Survey as required to maintain alignment and grade;
- Repair and replacement of any items not specifically mentioned elsewhere in these specifications;
- Trench excavation and backfill;
- All gaskets and appurtenances required to make pipe connections;
- Type 1 bedding;
- Type 2 bedding;
- Exploratory excavation and existing utility crossings;
- Remove spoils generated by pipe installation;
- Provide and install valve;
- Required testing of valve;
- Provide and install drain rock;
- Fine grading of disturbed area.

◆ Measurement: Measurement shall be per each stop/drain valve installed.

◆ Payment: Payment shall be by the unit price bid for each stop/drain valve installed listed in the proposal.

28. RV Water Hookup

◆ General: This bid item shall include providing and installing an RV water hookup.

◆ Work Included:
- All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
- Connection to pipe;
- Utility bracing/support and coordination with Utility Owners;
- Disposal of existing pipe and appurtenances as required;
- Provide compaction testing from an independent testing firm;
- Clearing and grubbing;
- Survey as required to maintain alignment and grade;

- Repair and replacement of any items not specifically mentioned elsewhere in these specifications;
- Trench excavation and backfill;
- All gaskets and appurtenances required to make pipe connections;
- Type 1 bedding;
- Type 2 bedding;
- Exploratory excavation and existing utility crossings;
- Remove spoils generated by pipe installation;
- Provide and install pipe, fittings and hose bib;
- Provide and install cedar post;
- Secure piping to post;
- Fine grading of disturbed area.

◆ Measurement: Measurement shall be per each RV water hookup installed.

◆ Payment: Payment shall be by the unit price bid for each RV water hookup installed listed in the proposal.

29. Campground Water Hydrant

◆ General: This bid item shall include providing and installing a campground water hydrant.

◆ Work Included:
- All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
- Connection to pipe;
- Utility bracing/support and coordination with Utility Owners;
- Disposal of existing pipe and appurtenances as required;
- Provide compaction testing from an independent testing firm;
- Clearing and grubbing;
- Survey as required to maintain alignment and grade;
- Repair and replacement of any items not specifically mentioned elsewhere in these specifications;
- Trench excavation and backfill;
- All gaskets and appurtenances required to make pipe connections;
- Type 1 bedding;
- Type 2 bedding;
- Exploratory excavation and existing utility crossings;
- Remove spoils generated by pipe installation;
- Provide and install pipe, fittings and yard hydrant;

- Provide and install bollards;
- Provide and pour concrete slab with required reinforcement;
- Provide and install base course;
- Provide and install drain rock;
- Provide and install floor drain and piping;
- Fine grading of disturbed area.

◆ Measurement: Measurement shall be per each campground water hydrant installed.

◆ Payment: Payment shall be by the unit price bid for each campground water hydrant installed listed in the proposal.

30. 4" SCH 40 PVC Sewer Piping

◆ General: This bid item shall include the installation of gravity sewer main and/or service.

◆ Work Included:
- All labor, tools, equipment, materials, royalties, and incidentals needed to complete the work as specified;
- Connection to existing manholes;
- Utility bracing / support and coordination with Utility Owners;
- Dewatering trench;
- Disposal of existing pipe and manholes as required;
- Provide compaction testing from an independent testing firm;
- Clearing and grubbing;
- Survey as required to maintain alignment and grade;
- Repair and replacement of any items not specifically mentioned elsewhere in these specifications;
- Trench excavation and backfill;
- All gaskets and appurtenances required to make pipe connections;
- Type 1 bedding;
- Type 2 bedding;
- Exploratory excavation and existing utility crossings;
- Remove spoils generated by pipe installation;
- Provide and install pipe;
- Required testing of pipe;
- Fine grading.

- Measurement: Measurement shall be per lineal foot of pipe installed including fittings and valves. Measurement shall be to the nearest foot.

- Payment: Payment shall be by the unit price bid per lineal foot of pipe listed in the proposal.

31. Sewer Cleanout

- General: This bid item shall include providing and installing sewer cleanout.

- Work Included:
  - All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
  - Connection to pipe;
  - Utility bracing/support and coordination with Utility Owners;
  - Disposal of existing pipe and appurtenances as required;
  - Provide compaction testing from an independent testing firm;
  - Clearing and grubbing;
  - Survey as required to maintain alignment and grade;
  - Repair and replacement of any items not specifically mentioned elsewhere in these specifications;
  - Trench excavation and backfill;
  - All gaskets and appurtenances required to make pipe connections;
  - Type 1 bedding;
  - Type 2 bedding;
  - Exploratory excavation and existing utility crossings;
  - Remove spoils generated by pipe installation;
  - Provide and install pipe and fittings;
  - Fine grading of disturbed area.

- Measurement: Measurement shall be per each cleanout installed.

- Payment: Payment shall be by the unit price bid for each cleanout installed listed in the proposal.

32. Septic Tank/Dose Vault

- General: This bid item shall include providing and installing a combination septic tank and dose vault including appurtenances

- Work Included:
  - All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
  - Connections to pipe;
  - Utility bracing/support and coordination with Utility Owners;
  - Disposal of existing pipe and appurtenances as required;

- Provide compaction testing from an independent testing firm;
- Clearing and grubbing;
- Survey as required to maintain alignment and grade;
- Repair and replacement of any items not specifically mentioned elsewhere in these specifications;
- Excavation and backfill;
- All gaskets and appurtenances required to make pipe connections;
- Type 1 bedding;
- Type 2 bedding;
- Exploratory excavation and existing utility crossings;
- Remove spoils generated by pipe installation;
- Provide and install tanks;
- Provide and install manways;
- Provide and install effluent filter;
- Provide and install all piping;
- Provide and install splice box;
- Fine grading of disturbed area.

◆ Measurement: Measurement shall be per each septic tank/dose tank installed.

◆ Payment: Payment shall be by the unit price bid for each septic tank/dose tank installed listed in the proposal.

33. Pumps and Controls

◆ General: This bid item shall include the septic effluent pump and associated controls

◆ Work Included:
- All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
- Provide and install effluent pump;
- Provide and install control panel;
- Provide and install floats and float tree;
- Provide and install all cabling and components between the control panel, floats and pump;
- Testing of wastewater pumping system.

◆ Measurement: Measurement shall be one lump sum bid item.

◆ Payment: Payment shall be by the price bid for the lump sum bid item listed in the proposal.

34. 4" SCH 40 PVC Force Main

- General: This bid item shall include the installation of sewer force main.

- Work Included:
  - All labor, tools, equipment, materials, royalties, and incidentals needed to complete the work as specified;
  - Connection to existing manholes;
  - Utility bracing / support and coordination with Utility Owners;
  - Dewatering trench;
  - Disposal of existing pipe and manholes as required;
  - Provide compaction testing from an independent testing firm;
  - Clearing and grubbing;
  - Survey as required to maintain alignment and grade;
  - Repair and replacement of any items not specifically mentioned elsewhere in these specifications;
  - Trench excavation and backfill;
  - All gaskets and appurtenances required to make pipe connections;
  - Type 1 bedding;
  - Type 2 bedding;
  - Exploratory excavation and existing utility crossings;
  - Remove spoils generated by pipe installation;
  - Provide and install pipe;
  - Required testing of pipe;
  - Fine grading.

- Measurement: Measurement shall be per lineal foot of pipe installed including fittings and valves. Measurement shall be to the nearest foot.

- Payment: Payment shall be by the unit price bid per lineal foot of pipe listed in the proposal.

35. Drainfield Chambers and Piping

- General: This bid item shall include providing and installing drain field chambers and piping.

- Work Included:
  - All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
  - Survey as required to maintain alignment and grade;
  - Trench excavation and backfill;
  - All gaskets and appurtenances required to make pipe connections;
  - Provide and install drainfield chambers;
  - Provide and install pressure dosing piping;
  - Provide and install drain field manifold piping;
  - Fine grading of disturbed area.

- Measurement: Measurement shall be per lineal foot of drainfield chamber installed not including end caps. Measurement shall be to the nearest foot.

- Payment: Payment shall be by the unit price bid per lineal foot of drainfield chambers listed in the proposal.

36. RV Sewer Hookup

- General: This bid item shall include providing and installing an RV sewer hookup.

- Work Included:
  - All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
  - Connection to pipe;
  - Utility bracing/support and coordination with Utility Owners;
  - Disposal of existing pipe and appurtenances as required;
  - Provide compaction testing from an independent testing firm;
  - Clearing and grubbing;
  - Survey as required to maintain alignment and grade;
  - Repair and replacement of any items not specifically mentioned elsewhere in these specifications;
  - Trench excavation and backfill;
  - All gaskets and appurtenances required to make pipe connections;
  - Type 1 bedding;
  - Type 2 bedding;
  - Exploratory excavation and existing utility crossings;
  - Remove spoils generated by pipe installation;
  - Provide and install pipe and, fittings;
  - Provide and install cedar post;

- Fine grading of disturbed area.

- Measurement: Measurement shall be per each RV sewer hookup installed.

- Payment: Payment shall be by the unit price bid for each RV sewer hookup installed listed in the proposal.

37. Latrine

- General: This bid item shall include providing and installing precast concrete latrines.

- Work Included:
  - All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
  - Provide compaction testing from an independent testing firm;
  - Survey as required;
  - Repair and replacement of any items not specifically mentioned elsewhere in these specifications;
  - Excavation and backfill;
  - Remove spoils generated by installation;
  - Provide and install crushed base course;
  - Provide and install precast concrete latrine;
  - Fine grading of disturbed area.

- Measurement: Measurement shall be per each latrine installed.

- Payment: Payment shall be by the unit price bid for each latrine installed listed in the proposal.

38. 6" Conduit

- General: This bid item shall include providing and installing 6" conduit.

- Work Included:
  - All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
  - Provide compaction testing from an independent testing firm;
  - Survey as required to maintain alignment and grade;
  - Repair and replacement of any items not specifically mentioned elsewhere in these specifications;
  - Trench excavation and backfill;

- Type 1 bedding;
- Remove spoils generated by pipe installation;
- Provide and install pipe and fittings;
- Provide and install pipe end markers
- Fine grading of disturbed area.

- Measurement: Measurement shall be per lineal foot of 6" conduit installed not including end caps. Measurement shall be to the nearest foot.

- Payment: Payment shall be by the unit price bid per lineal foot of 6" conduit installed listed in the proposal.

39. 15"x21" Arch CMP with FETS

- General: This bid item shall include providing and installing 15" x 21" Arch CMP with FETS on both ends.

- Work Included:
  - All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
  - Provide compaction testing from an independent testing firm;
  - Survey as required to maintain alignment and grade;
  - Repair and replacement of any items not specifically mentioned elsewhere in these specifications;
  - Trench excavation and backfill;
  - Remove spoils generated by pipe installation;
  - Provide and install pipe and FETS;
  - Fine grading of disturbed area.

- Measurement: Measurement shall be per lineal foot of 15"x 21" CMP installed including FETS. Measurement shall be to the nearest foot.

- Payment: Payment shall be by the unit price bid per lineal foot of 15"x 21" CMP installed listed in the proposal.

40. Relocate Kiosk, Pay Box and Signs

- General: This bid item shall include relocating an existing kiosk, pay box and signs.

- Work Included:
  - All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;

- Provide compaction testing from an independent testing firm;
- Survey as required to maintain alignment and grade;
- Repair and replacement of any items not specifically mentioned elsewhere in these specifications;
- Foundation post excavation and backfill;
- Foundation post concrete and reinforcement;
- Remove and relocate existing kiosk structure;
- Remove and relocate pay box;
- Remove and relocate signs.

◆ Measurement: Measurement shall be one lump sum bid item.

◆ Payment: Payment shall be by the price bid for the lump sum bid item listed in the proposal.

41. Relocate Rectangular Wood Barrier Post

◆ General: This bid item shall include relocating rectangular wood barrier posts.

◆ Work Included:
- All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
- Remove and install rectangular barrier posts;
- Survey as required locate;
- Excavation and backfill;
- Fine grading of disturbed area.

◆ Measurement: Measurement shall be per each rectangular barrier post relocated.

◆ Payment: Payment shall be by the unit price bid for rectangular barrier post relocated listed in the proposal.

42. Import Topsoil

◆ General: This bid item shall include importing topsoil.

◆ Work Included:
- All labor, tools, equipment, materials, and incidentals needed to complete the work as specified;
- Load, haul and place topsoil from onsite source identified in plans.
- Reclamation of disturbance at topsoil borrow area.

- Measurement: Measurement shall be per cubic yard of topsoil provided. Measurement shall be rounded to the nearest cubic yard.

- Payment: Payment shall be by the unit price bid for each cubic yard of topsoil provided listed in the proposal.

43. Topsoil, Seed and Mulch

- General: This bid item shall include the topsoil, seeding, and fertilizing of disturbed upland grass areas.

- Work Included:
  - All labor, tools, equipment, materials, royalties, and incidentals needed to complete the work as specified;
  - Fine grading and conditioning of topsoil;
  - Provide and place seed and mulch;
  - Maintenance of seeded area as required by specifications.

- Measurement: Measurement shall be one lump sum bid item.

- Payment: Payment shall be by the price bid for the lump sum bid item listed in the proposal.

44. Straw Wattle

- General: This bid item shall include the installation/maintenance of straw wattle to prevent erosion.

- Work Included:

  - All labor, tools, equipment, materials, royalties, and incidentals needed to complete the work as specified;
  - Provide and install straw wattle and incidentals as noted on the construction drawings or required by permits;
  - Maintenance, repair and replacement of straw wattle throughout time SWPPP permit is in place.

- Measurement: Measurement shall be per lineal foot of straw wattle installed. Measurement shall be to the nearest foot.

- Payment: Payment shall be by the unit price bid per lineal foot of straw wattle listed in the proposal.

45. Elevated Pad for Electrical Service

- General: This bid item shall include the installation/maintenance of straw wattle to prevent erosion.

- Work Included:

  - All labor, tools, equipment, materials, royalties, and incidentals needed to complete the work as specified;
  - Survey;
  - Strip topsoil,
  - Haul and place fill imported from on site as shown in plans;
  - Replace topsoil.

- Measurement: Measurement shall be per each elevated pad installed.

- Payment: Payment shall be by the unit price bid per elevated pad listed in the proposal.

46. Electrical Improvements

- General: This bid item shall include the installation/of all electrical components defined in the project documents.

- Work Included:

  - All labor, tools, equipment, materials, royalties, and incidentals needed to complete the work as specified;
  - Provide and install all electrical components conductors and appurtenances as defined in the electrical plans;
  - Trench excavation and backfill for buried conductors and conduit;
  - Permits.

- Measurement: Measurement shall be one lump sum bid item.

- Payment: Payment shall be by the price bid for the lump sum bid item listed in the proposal.

24. GEOTECHNICAL CONDITIONS

A geotechnical investigation was not completed for this project. Soils are generally classified as loam, silt and sand with little rock or cobbles. However, bedrock is near the surface in some portions of the project site. Encountering bedrock that impedes excavations required for the project will be considered a change in conditions and a change order will be negotiated.

The soil is subject to settlement and compaction and testing of all trenches and embankments is required including electrical trenches.

Encountering groundwater is not anticipated.

25. PROJECT WORK DATES

The Notice to Proceed for this project will be issued with a work start date of September 4, 2013. It is the intention of the Owner to complete work in its entirety in the fall of 2013, unless prohibited by weather.

26. PROGRESS PAYMENTS PRIOR TO NOTICE TO PROCEED

A Notice of Award will be issued to the apparent low bidder within 30 days of the Bid Opening. The successful bidder will have 15 days to enter a fully executed contract, per Section 11.1, Instructions to Bidders. Prior to issuance of the Notice to Proceed, monthly Applications for Payment may be received by the Owner, and approved by the Engineer, for material costs and Performance, Labor and Material Payment Security Bond costs by submitting actual cost invoices. Five percent (5%) retainage will be withheld on all progress payments until final acceptance is achieved, per General Conditions, Section 9.3.7.

TECHNICAL SPECIFICATIONS
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Note:
All other work shall be performed in compliance with the Montana Public Works Specification- Sixth Edition. The Montana Public Works Specifications shall be modified to require the Contractor to provide compaction testing through an independent testing laboratory, not the Owner.

GENERAL EQUIPMENT STIPULATIONS

SECTION 01/610

1. SECTION INCLUDES

   A. All equipment furnished and installed under this Contract shall conform to the general stipulations set forth in this section except as otherwise specified in other sections.

2. GENERAL

   A. Manufacturer's Experience: Unless specifically named in the Specifications, a manufacturer shall have furnished equipment of the type, size, and service specified which has been in successful operation at two facilities for not less than the past five years.

   B. Manufacture shall provide references from their installation including a contact name and phone number upon request.

   C. Workmanship and Materials:

      1. **CONTRACTOR** shall guarantee all equipment against faulty or inadequate design, improper assembly or erection, defective workmanship or materials, and leakage, breakage, or other failure. Materials shall be suitable for service conditions.

      2. All equipment shall be designed, fabricated, and assembled in accordance with recognized and acceptable engineering and shop practice. Individual parts shall be manufactured to standard sizes and gauges so that repair parts, furnished at any time, can be installed in the field. Like parts of duplicate units shall be interchangeable. Equipment shall not have been in service at any time prior to delivery, except as required by tests.

      3. Except where otherwise specified, structural and miscellaneous fabricated steel used in equipment shall conform to AISC standards. All structural members shall be designed for shock or vibratory loads. Unless otherwise specified, all steel which will be submerged, all or in part, during normal operation of the equipment shall be at least 1/4-inch thick.

   D. Seismic Loading Design Provisions: Machinery, equipment, and components such as tanks, piping, and electrical panels, including their supports and anchorages, designed by manufacturers or suppliers, shall be designed in accordance with the provisions of the latest International Building Code to withstand seismic loads in addition to other loads. Design shall be performed by a licensed professional engineer familiar with seismic design. Submittals shall be certified, by the Design Engineer, that equipment designs conform to all applicable International Building Code requirements including provisions to withstand seismic load for the following criteria:

      1. Seismic Importance Factor, IE = 1.25.

      2. Spectral response accelerations, SS = 110.2%, S1 = 29.3%.

3. Site Class B.

4. Seismic Design Category D.

E. Elevation: The elevation of the site is approximately 4200 feet above mean sea level. All equipment furnished shall be designed to meet stipulated conditions and to operate satisfactorily at this elevation.

F. Listed Manufacturers: The use of a manufacturer's name, model or catalog number is intended to establish a standard of quality and the general configuration required only. Other manufacturer's equipment will be considered in accordance with the GENERAL CONDITIONS.

G. Single Source: Like items of equipment shall be the end product of one manufacturer in order to achieve standardization.

H. Manufacturer's Representative:

1. Manufacturer shall provide a Manufacturer's Representative where specified to assist in the installation, adjustment, startup, certification and operating training.

2. Manufacturer's Representative shall be an employee of manufacturer who is factory trained and knowledgeable in the technical aspects of the products and systems including both operation and maintenance.

3. When the services of the representative are specifically required for a listed time period, the days shall represent 8 hours straight time exclusive of Saturdays, Sundays and holidays. Travel time is considered incidental to the work and will not apply to the required listed time.

4. If listed time is not required or is modified, an appropriate adjustment in payment shall be made. If the provided Manufacturer’s Representative is found deficient in training or experience by the Owner or Engineer, the manufacturer shall furnish another acceptable representative.

5. Any training shall be at the job site at times scheduled by the resident engineer. And will be considered concluded only when the resident engineer is satisfied in regard to complete and thorough coverage.

3. ACCESSORIES

A. General: All equipment shall be provided with the following accessories as applicable.

B. Safety Guards: All belt or chain drives, fan blades, couplings, and other moving or rotating parts shall be covered on all sides by a safety guard in complete accordance with the requirements of OSHA. Each guard shall be designed for easy installation and removal. All necessary supports and accessories shall be provided for each guard. Supports and accessories, including bolts, shall be galvanized. All safety guards in outdoor locations shall be designed to prevent the entrance of rain and dripping water.

C. Anchor Bolts: Equipment manufacturers shall provide anchor bolt size, location and loads, including seismic loading. Anchor bolts will be provided by others, unless noted to be supplied by the equipment manufacturer in the Equipment Specifications.

D. Lifting Lugs: Equipment weighing over 100 pounds shall be provided with lifting lugs.

E. Special Tools: Equipment requiring periodic repair and adjustment shall be furnished complete with all special tools, instruments, and accessories required for proper maintenance. Equipment requiring special devices for lifting or handling shall be furnished complete with those devices.

F. Spare Parts:

1. Furnish all spare parts specified or purchased prior to requesting the issuance of a Certificate of Completion and/or operation of the equipment by the Owner.

2. Spare parts and special tools shall be properly packaged to avoid damage, in their original cartons insofar as possible, and shall be stored in a location as determined by the Engineer. Any spare parts found to be damaged or otherwise inoperable at the time of delivery shall be replaced or, if approved by the Engineer, satisfactorily repaired.

3. Spare parts and special tools shall be labeled with a minimum 3-inch by 6-inch manila spare parts tag with such information as the part description, the manufacturer's part number, the applicable equipment description and manufacturer, the quantity of parts delivered in each package, the applicable specification section, and the **CONTRACTOR'S** and Project's name. This tag shall be firmly affixed to, and prominently displayed on the outside of each package.

4. MISCELLANEOUS

A. Lubrication:

1. Equipment shall be adequately lubricated by systems which require attention no more frequently than weekly during continuous operation. Lubrication systems shall not require attention during startup or shutdown and shall not waste lubricants.

2. Lubricants of the type recommended by the equipment manufacturer shall be provided in sufficient quantity to fill all lubricant reservoirs and to replace all consumption during testing, startup, and operation prior to acceptance of equipment by Owner. Unless otherwise specified or permitted, the use of synthetic lubricants will not be acceptable.

3. Lubrication facilities shall be convenient and accessible. Oil drains and fill openings shall be easily accessible from the normal operating area or platform. Drains shall allow for convenient collection of waste oil in containers from the normal operating area or platform without removing the unit from its normal installed position.

B. Shop Painting:

1. All steel and iron surfaces shall be protected by suitable paint or coatings applied in the shop. Surfaces which will be inaccessible after assembly shall be protected for the life of the equipment. Exposed surfaces shall be finished, thoroughly cleaned, and filled as necessary to provide a smooth, uniform base for painting. Electric motors, speed reducers, starters, and other self-contained or enclosed components shall be coated with a high-grade, oil resistant enamel. Coatings shall be suitable for the environment where the equipment is installed. Color shall be the manufacturer's standard, unless stated otherwise in the Technical Specifications.

5. PREPARATION FOR SHIPMENT

A. Preparation:

1. All equipment shall be suitably packaged to facilitate handling and protect against damage during transit and storage. All equipment shall be boxed, crated, or otherwise completely enclosed and protected during shipment, handling, and storage. All equipment shall be protected from exposure to the elements and shall be kept dry at all times.

2. Painted surfaces shall be protected against impact, abrasion, discoloration, and other damage. Painted surfaces which are damaged prior to acceptance of equipment shall be repainted to the satisfaction of Engineer.

3. Grease and lubricating oil shall be applied to all bearings and similar items.

4. Each item of equipment shall be tagged or marked as identified in the delivery schedule or on the Shop Drawings. Complete packing lists and bills of material shall be included with each shipment.

6. OPERATION AND MAINTENANCE (O&M) MANUALS

A. In addition to any requirement of other specifications, the manufacturer shall furnish four (4) copies of a complete instruction manual for installation, operation, maintenance, and lubrication requirements for each component of mechanical and electrical equipment or system. Each instruction manual furnished shall be clearly labeled to designate the system or equipment for which it is intended with reference to the building and equipment number. and the specification section where the item is specified.

B. The manuals shall be furnished at least 75 calendar days prior to the scheduled completion of the work; but in no case shall submission of the manuals be delayed beyond 75 percent completion point of the work. Submission of the manuals shall precede payment for all work completed in excess of the 75 percent completion level on the particular equipment and systems for which the manuals are due. Any deficiencies found by the Engineer to exist in the manuals submitted shall be corrected within 30 calendar days following notification of the deficiencies.

C. Each instruction manual shall include, but not be limited to the following:

1. Diagrams and illustrations.

2. Detailed description of the function of each principal component of the system.

3. Performance and nameplate data.

4. Installation instructions.

5. Procedure for starting.

6. Proper adjustment.

7. Test procedures.

8. Procedure for operating.

9. Shutdown instructions.

10. Emergency operating instruction and troubleshooting guide.

11. Safety precautions.

12. Maintenance and overhaul instruction which shall include detailed assembly drawings with part numbers, parts list, instructions for ordering spare parts, and complete preventive maintenance instructions required to ensure satisfactory performance and longevity of the equipment.

13. Lubrication instructions, which shall list points to be greased or oiled, shall recommend type, grade, and temperature range of lubricants, and shall recommend frequency of lubrication.

14. List of electrical relay settings and control and alarm contact settings.

15. Electrical interconnection wiring diagram for equipment, including all control and lighting systems.

D. Manuals shall be complete in all respects for all equipment, controls, accessories, and associated appurtenances.

E. Manuals shall be assembled in one or more binders, each with title page, typed table of contents, and heavy section dividers with numbered plastic index tabs. Each manual shall be divided into sections paralleling the Equipment Specifications. Binders shall be three-ring, hard-back type. All data shall be punched for binding and composition and printing shall be arranged so that punching does not obliterate any data. The project title, division designation, and manual title printed thereon shall be as furnished by the Engineer.

F. When more than one binder is required, they shall be labeled "Vol. I." "Vol. 2," and so on. The table of contents for the entire set, identified by volume number, shall appear in each

binder. Submit manual organization and format to the Engineer for approval prior to manual preparation.

G. Each O&M Manual shall be transmitted to the Engineer prior to installation of the equipment and all equipment shall be serviced in accordance with the manufacturer's recommendations prior to operation. A service record shall be maintained on each item of equipment and shall be delivered to the Engineer prior to final acceptance of the project.

7. WARRANTY

A. A manufacturer's warranty is required for each piece of equipment as defined in the Contract General Conditions. The One-Year Correction Period shall begin at Substantial Completion of the entire project and end one year after final acceptance of the project.

8. TESTS

A. Pre-test mechanical and electrical equipment and systems and make corrections required for proper operation of such systems before requesting final tests. Final tests will not be conducted unless pre-tested.

B. Conduct final tests required in various sections of specifications in presence of authorized representative of the Contracting Officer. **CONTRACTOR** shall furnish all labor, materials, equipment, instruments, and forms, to conduct and record such tests.

END OF SECTION 01/610

SECTION 01750

FINAL CLEANUP

PART 1 GENERAL

1. DESCRIPTION

   A. This work consists of final cleanup of the project site prior to final acceptance.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

1. CONTRACTOR RESPONSIBILITES

   The contractor shall be responsible for final clean up at the end of the project to a level satisfactory to the owner. All construction debris, no mater how small, shall be collected and removed from the site. All wheel ruts shall be filled in and be leveled to match the adjacent grade and material. Re-seeding or re-sodding, or other re-surfacing may be necessary to repair any construction related impacts or damage.

   All survey markings, stakes, temporary paint marks, flagging and other devices shall be removed regardless of who installed them. All excess pavement, concrete, gravel, soil, or other construction materials not intended for permanent use shall be removed.

   All final slopes shall be dressed manually to remove woody debris, accumulated trash and oversized material. Any new slope or topsoil surfaces shall be hand raked to provide a uniform appearance. The contractor shall dress all gravel, pavement and concrete edges to eliminate abrupt edges and provide a smooth transition. All construction related temporary sediment control devices shall be removed as soon as practical.

PART 4 MEASUREMENT AND PAYMENT

1. PAYMENT

   Unless specifically noted otherwise, all final cleanup work shall be incidental to other work items in the contract and no separate payment shall be made.

END OF SECTION 01750

SECTION 02/535

WASTEWATER TREATMENT AND DISPOSAL SYSTEM

PART 1 GENERAL

1. WORK INCLUDED

A. This section covers the work necessary to furnish and install piping, tanks, pumps, valves and infiltration chambers for the construction and startup of a complete wastewater treatment and disposal system.

B. Work included in this section is as follows:

1. Wastewater Piping and Valves.
2. Combination Septic and Dosing Tank.
3. Pressure Dosed Drain Field.

2. GENERAL

A. The Drawings do not show all details of all piping systems, and instead only portray the functionality required. The **CONTRACTOR** shall provide all accessories, adapters, appurtenances and supports to achieve a complete and functional installation. The **CONTRACTOR** shall verify all piping routings and locating dimensions shown for conflicts with other piping or utilities, and shall provide any offsets required to achieve clearance at no additional cost to the **OWNER**. In the event changes to the locations of equipment or piping shown are necessary, the **CONTRACTOR** shall submit such changes in writing to the **ENGINEER** before proceeding with such changes.

B. Manufacturers' references are included herein for reference and to establish the required level of quality; "or equal" products may be proposed subject to the requirements for Submittal review.

3. CODES, PERMITS AND COMPLIANCE

A. Plumbing under these Specifications shall conform to all requirements of the current codes, standards and ordinances applicable to work. In event of conflicts between these Specifications and applicable codes or standards, the codes and standards shall govern.

B. All piping, wastewater system components and accessories shall be installed in strict accordance with the laws and regulations of the State of Montana and Bighorn County.

C. Any permits legally required for the work under these Specifications shall be the responsibility of the **CONTRACTOR** to obtain. Costs of such permits and scheduling of any inspections required in conjunction with such permits or associated requirements shall be the responsibility of the **CONTRACTOR**.

D. Completed piping systems shall be tested by the **CONTRACTOR** in accordance with all applicable codes and standards before charging such piping with wastewater.

4. SUBMITTALS

A. The **CONTRACTOR** shall provide the following information:

1. Provide manufacturers' catalog information, brochures, warranties and operation and maintenance manuals for each product used in the system.

PART 2 PRODUCTS

1. SEWER PIPE

A. Gravity Pipe – Gravity pipe shall be minimum 4-inch diameter schedule 40 PVC pipe and fittings joined with solvent weld joints.

B. Pressure Pipe- Pressure pipe shall be 40 PVC pipe and fittings joined with solvent weld joints and fittings.

C. All pipe shall meet the requirements of ASTM D1785.

2. SEPTIC TANK

A. Septic tanks shall meet the standards for septic tanks, Montana Department of Environmental Quality (MDEQ), Circular DEQ 4, Chapter 7. Tanks shall be manufactured as by a qualified Concrete Septic Tank Manufacturer.

B. Tank construction requirements include, but are not limited to the following:

1. Septic tanks shall be constructed of precast concrete.
2. Tanks shall be structural sound and capable of withstanding loads created by 6-feet of burial depth to the top of the tank.
3. The walls and floor of the tank shall be a minimum of 3-inches thick if adequately reinforced with steel and a minimum of 6-inches thick if not reinforced. Concrete for septic tanks shall have a water/cement ratio of less than 0.45, a 28 day compressive strength of at least 4,000 psi and shall be made with sulfate resistant cement (tricalcium aluminate content of less than 8 percent).
4. Concrete covers shall be a minimum of 3-inches thick and adequately reinforced.
5. The inlet into the tank shall be 4-inches minimum in diameter and shall enter the tank 3-inches above the liquid level.
6. Tees or baffles shall extend a minimum of 7-inches above the liquid level.
7. Double compartment septic tanks shall be constructed so the second compartment vents to the first compartment and the first compartment shall vent to the gravity sewer line inlet.
8. All septic tanks shall have an air space that is 20% or greater than the liquid capacity of the tank.
9. All septic tanks shall be tested in place for water tightness by means of a water

or vacuum test (as per DEQ-4, Chapter 7.3)

C. Tank risers shall be 30-inch diameter minimum, constructed of a PVC material or precast concrete with concentric ribs. Risers shall be solidly secured to the septic tank. Lids shall be precast concrete or fiberglass construction, secured to the riser with SS bolts, green in color, and shall include a polyurethane gasket to provide a water tight seal. PVC Risers and fiberglass lids, if used, shall be as manufactured by *Orenco* or approved equal.

3. EFFLUENT FILTER

A. Septic tank outlets shall be equipped with an effluent filter. Effluent filters shall be PVC housing and handle with a filter cartridge with an effective opening of 1/8-inch. Filter shall include a bracket for mounting a tank level alarm. Housing height shall be 44-inches and the cartridge height 36-inches.

B. Effluent filters shall be designed for a flowrate of 1200 gpd.

C. Effluent Filter shall be *Orenco model FTS0444-36A*, or **ENGINEER** approved equal.

4. DOSING TANK

A. Dosing tanks shall meet the requirements of the septic tanks specification.

5. DOSING PUMPS

A. The pumps in the drain field dosing vault shall be the sealed submersible type, single phase, 230V, 60 Hz and 3450 rpm. The motor shall have thermal overload protection with automatic reset. Discharge shall be 2-inch NPT and the pump shall be capable of passing a ¾-inch solid. The pump shall meet National Electrical Code, Class I, and Division 2 requirements and shall be UL and/or CSA listed.

B. The pump for the Pee Wee Point North system shall be ½ horsepower. The pump shall be a *Hydromatic Model SHEF50* or an approved equal.

C. The pump for the Pee Wee Point South system shall be 1 horsepower. The pump shall be a *Hydromatic Model SHEF100* or an approved equal.

D. The operating point for the Pee Wee Point South shall be 52.1 U.S. gpm, and 63.2 feet TDH. The operating point for the Pee Wee Point North shall be 42.3 U.S. gpm, and 37.8 feet TDH.

6. DOSING PUMPS CONTROL PANEL

A. Control panel shall be designed to control pump operation based on signals from float switches for pump on and pump off water levels.

B. Panels shall be repairable in the field without the use of soldering irons or substantial disassembly.

C. Panel shall include the following features:
   1. Hand-off-auto (HOA) switch for automatic or manual pump control
   2. Main Disconnect to isolate power from panel
   3. Circuit breaker and contactor
   4. Ground lug
   5. Audible Alarm: minimum of 80 db sound pressure at 24-inches, warble tone.
   6. Visual Alarm: NEMA 4X rated, top mounted beacon for exterior installation.
   7. Test/alarm silence relay
   8. Enclosure: NEMA 4X with lockable latch
   9. Lighting Protection
   10. Alarm Conditions to include:
      a. Pump failure
      b. High water
      c. High water in septic tank

D. Control panels shall be as manufactured by *Alderon Industries* or **ENGINEER** approved equal.

7. FLOAT SWITCHES

A. Float switches shall be tilt sensitive, narrow angle float switches which are sealed in a non-corrosive PVC housing. Switches shall be UL 508 listed for water and sewage and CSA certified and shall include a minimum 16 gauge flexible cable. Float switches shall be as manufactured by *Alderon Industries* or **ENGINEER** approved equal.

8. ELECTRICAL SPLICE BOX

A. Electrical splice box shall be UL approved for wet locations. Splice boxes shall be PVCF construction, designed to mount outside the riser and rated NEMA 6P. Splice boxes shall be Orneco or approved equal.

9. INFILTRATION CHAMBERS

A. Infiltration chambers for absorption trench construction shall be 12-inches high by 34-inches wide and have an effective length of 48-inches.

B. Infiltration chamber shall be designed to withstand loads from a 16,000 lbs axle with 12-inches of cover material.

C. Chamber system shall include end caps with multiple inlet/outlet ports molded into the plastic.

D. Infiltration Chamber system shall be *Infiltrator Systems, Inc. Quick4 Standard Chamber*.

PART 3 EXECUTION

1. TRENCHES

A. Pipe trenches shall be constructed as detailed in the Montana Public Works Specification, latest edition.

B. Drain field trenches shall be constructed as shown on the plans. Construction of trenches shall not occur if soil moisture is high. The Engineer will determine if conditions are acceptable for construction. The Contractor shall take care not to compact the drain field area.

2. PIPING

A. Gravity piping shall be installed on straight line grade between the dosing vault and the entrance to the drain field manifold.

B. Pressure piping will be installed to drain back to the dosing vault. No low points that will accumulate water are allowed.

3. INFILTRATION CHAMBERS

A. Install infiltration chambers is accordance with manufacturer's recommendations.

B. The infiltration chamber bed shall be level, free of irregularities and debris.

4. TANKS

A. Tanks shall be installed as detailed in the plans and according to manufacturer's recommendations. Placement of individual septic tanks shall meet all the requirements set forth in Circular DEQ 4. Upon installation the center seam and all penetrations shall be grouted with a sand based cement grout on both sides. All tanks shall be tested for leakage after installation. The Contractor shall coordinate the testing with the Engineer. The Engineer or the Engineer's representative shall witness the testing.

5. PRESSURE DOSING SYSTEM

A. Install the pressure dosing system in compliance with the plans and specifications.

B. The drain field shall be pressure tested to verify proper installation and operation. For the purpose of the testing, the orifices in the laterals shall be placed in the twelve (12) o'clock position. The pump vault shall be filled with clean water, and the pump engaged in such a manner and for as many times as is necessary to adequately test the system operation. The test shall include verification of float settings (using the water level to activate the floats). When the pump test has been verified and accepted by the Engineer and the Bighorn County Sanitarian (if applicable), the pressure lines shall be turned such that the orifices are in the six (6) o'clock position (down) and the fittings dried and glued.

The Contractor is responsible for ensuring the system is operating properly prior to scheduling the testing. If a test is scheduled and the system is not ready for testing or fails the test, the Contractor shall be responsible for additional testing costs (i.e.

Engineering Costs). The Owner shall be responsible for the cost of the Engineer for one test for the drain field dosing system. This testing shall include but not be limited to setting of the floats and timer.

END OF SECTION 02/535

SECTION 03/720

PRECAST CONCRTE LATRINE

PART 1 GENERAL

1. WORK INCLUDED

   A. This section covers the work necessary to furnish and install a precast concrete latrine.

   B. Work included in this section is as follows:
      1. Preparation of building foundation.
      2. Provide and place the building.

2. GENERAL

   A. The building shall be provided complete, ready for service with all doors, vents, and appurtenances as indicated in the drawings and this specification.

3. CODES, PERMITS AND COMPLIANCE

   A. The building shall conform to all requirements of the current editions of the IBC, and all other codes, standards and ordinances applicable to work. In event of conflicts between these specifications and applicable codes or standards, the codes and standards shall govern.

4. SUBMITTALS

   A. The **CONTRACTOR** shall provide the following information:
      1. Brochures, cut sheets, structural calculations, and a complete set of engineered drawings of the building and concrete test results.
      2. Color samples for owner selection.

5. MANUFACTURER CRITERIA

   A. The building manufacturer shall meet the following requirements at a minimum:
      1. Manufacturer shall be as follows or an engineer approved equal:

CXT, Incorporated
Spokane Industrial Park
3808 North Sullivan Road, Building 7
Spokane, WA 99216
Phone: 800-696-5766

Missoula Concrete Construction
P.O. Box 16086
Missoula, Montana 59808
Phone: 406-549-9682

6. DESIGN CRITERIA

A. The precast concrete utility building shall be designed to meet the following criteria. Design criteria include provisions of the 2009 IBC Code.
   1. Roof Snow Load
      a. 350 pounds per square foot snow load.
   2. Floor Load
      a. 400 pounds per square foot floor load.
   3. Wind Load
      a. 150 miles per hour (3 second gust) wind exposure C
   4. Earthquake
      a. Minimum of seismic zone 3 earthquake.
   5. Additional Design Standards
      a. The Building is all concrete. Design with a 4/12 roof pitch.
      b. The building shall have a minimum 4-inch wall, 4-1/2-inch roof, and 5-inch floor thickness.

7. WARRANTY

A. A one year manufacturer's warranty is required against defects and workmanship for all components of the building. In addition all concrete components shall carry a warranty of 20 years. The warranty period shall begin on the date of substantial completion.

PART 2 MATERIALS

1. GENERAL

A. Concrete - The concrete mix design will be designed to ACI 211.1 to produce concrete of good workability.
   1. Concrete will contain a minimum of 505 pounds of cementitious material per cubic yard. Cement will be a low alkali type III conforming to ASTM C-150.
   2. Coarse aggregates used in the concrete mix design will conform to ASTM C33 with the designated size of coarse aggregate #67.
   3. Minimum water/cement ratio will not exceed 0.45. Slump will not exceed 5-inches.
   4. Air-entraining admixtures will conform to ASTM C260. Water reducing admixtures will conform to ASTM C494, Type A. Other admixtures will not be used without engineer approval.

B. Colored Concrete
   1. Color additive will conform to ASTM C979. A 12-inch x 12-inch x 1-inch color sample shall be made available for customer approval.
   2. The following will contain colored concrete:
      a. Building walls
      b. The same brand and type of color additive shall be used throughout the manufacturing process.
      c. All ingredients will be weighed and the mixing operation will be

adequate to ensure uniform dispersion of the color.

C. Cold Weather Concrete

1. Cold weather concrete placement will be in accordance with ACI 306.
2. Concrete will not be placed if ambient temperature is expected to be below 35 degrees Fahrenheit during the curing period unless heat is readily available to maintain the surface temperature of the concrete at least 45 degrees F.
3. Materials containing frost or lumps of frozen materials shall not be used.

D. Hot Weather Concrete

The temperature of the concrete will not exceed 95 degrees Fahrenheit at the time of placement and when the ambient reaches 90 degrees Fahrenheit the concrete shall be protected with moist covering.

E. Concrete Reinforcement

1. All reinforcing steel will conform to ASTM A615. All welded wire fabric shall conform to ASTM A185.
2. All reinforcement will be new, free of dirt, oil, paint, grease, loose mill scale and loose or thick rust when placed.
3. Details not shown of drawings or specified will be to ACI 318.
4. Steel reinforcement shall be centered in the cross-sectional area of the walls and will have at least 1-inch of cover on the under surface of the floor and roof.
5. The maximum allowable variation for center-center spacing of reinforcing steel will be 1/2-inch.
6. Full lengths of reinforcing steel shall be used when possible. When splices are necessary on long runs; splices will be alternated from opposite sides of the components for adjacent steel bars. Lap bars #4 or smaller a minimum of 12-inches. Lap bars larger than #4 a minimum or 24 bar diameters.
7. Reinforcing bars will be bent cold. No bars partially embedded in concrete shall be field bent unless approved by the customer.

F. Sealers and Curing Compounds

1. Curing compounds, if used, shall be colorless, complying with ASTM C309, type I or 1-D.
2. Weatherproofing sealer for exterior of building shall be clear, pure acrylic water repellant penetrating sealer.

G. Caulking, Grout, Adhesive and Sealer

1. All caulking shall remain flexible and non-sag at temperatures from -50 to +194 degrees Fahrenheit.
2. Interior joints will be caulked with a paintable silicone based caulk.
3. Exterior joints will be caulked with a tripolymer sealant caulk which complements the exterior color.
4. Grout shall be a non-shrink type and will be painted to match the color of surrounding concrete as nearly as possible.
5. Epoxy concrete adhesive shall be two component, rigid, non-sag gel adhesive for bonding to dry or damp surfaces, moisture insensitive.
6. Portland cement mortar shall consist of one part Portland cement, three parts

sand and enough water to make workable mixture.

H. Paint
1. All paints and materials shall conform to all Federal specifications or be similar "top-of-the-line-components". Paints will not contain more than 0.06 percent by weight of lead.
2. Type of paints for buildings.
   a. Inside concrete surfaces
      1) Interior floors shall be a 1-part water based epoxy with a silica sand suspension to provide uniform texture. The color shall be gray.
      2) Interior walls and ceilings shall be a modified acrylic penetrating pigment. The color shall be white.
   b. Metal surfaces both inside and out
      1) DTM enamel
   c. Exterior concrete surfaces
      1) Exterior walls and roof shall be a pure acrylic water repellent penetrating stain in the same color as the walls or roof followed by a clear acrylic anti-graffiti sealer.

I. Steel Doors
1. Doors will be flush panel type 1-3/4-inch thick, minimum 16 gauge prime coated steel panels with minimum 12 gauge internal bracing channels with polystyrene core. Door size to be 3068 single door.
2. Door frames will be knockdown or welded type, single rabbet, minimum 16-gauge prime coated steel, width to suit wall thickness. Three (3) rubber door silencers will be provided on latch side of frame.

J. Door Hinges
1. Door hinges will be 3 per door with dull chrome plating 4-1/2-inch x 4-1/2-inch, adjustable tension, automatic-closing for each door.

K. Locket
1. Lockset shall be a deadbolt with US 26D chrome finish.
   Lockset shall be Schlage D70PD PLY 626 or approved equal.
2. Upper surface bolt shall be a Stanley 1088 with bright zinc finish and 6 ½-inch bolt strike, pad lockable or approved equal.
3. Lower surface bolt shall be a Stanley 1088 with bright zinc finish and 6 ½-inch bolt strike, pad lockable or approved equal.
4. Dead bolt shall be a Lori Lock standard model with a double cylinder 2 ¾-inch backset, and US26D finish or approved equal. The cylinder will be a standard 1 1/8-inch – 1 ¾-inch Schlage Mortise cylinder with compression ring and 626 finish or approved equal.

L. Threshold
1. An extruded aluminum threshold, Pemco #170 or approved equal.

M. Door Sweep/Seal

1. Door sweep/seal shall be Pemco #420ASL or approved equal

N. Wall Vents

1. Wall vents shall be crank operated allowing the unit to be opened or closed. Crank will be removable. Vent cover shall be 14 gauge 304 stainless steel painted with DTM and anchored into the concrete wall with high strength anti-rust tap con fasteners. Vent to come with insect screen. Cover to be recessed a minimum ¾-inch on exterior walls with a 45 degree bevel. Interior to be flush mounted. Wall vent shall not protrude from the wall.

PART 3 BUILDING MANUFACTURING

2. GENERAL

A. Mixing and Delivery of Concrete

1. Mixing and delivery of concrete shall be in accordance with ASTM C94, section 10.6 through 10.9 with the following additions.
   a. Aggregate and water shall be adjusted to compensate for differences in the saturated surface-dry condition
   b. Concrete shall be discharged as soon as possible after mixing is complete. This time shall not exceed 30 minutes.

B. Placing and Consolidating Concrete

1. Concrete shall be consolidated by the use of mechanical vibrators. Vibrators shall be sufficient to accomplish compaction but not to the point that segregation occurs.

C. Finishing Concrete

1. Interior floor and exterior slabs shall be floated and troweled until all marks are removed. A light broom finish shall be applied to the exterior slabs.
2. All exterior building walls and exterior screen walls shall be any one of available textures.
3. All exterior surfaces of the roof panels shall be any one of available textures. The underside of the overhang shall have a smooth finish.

D. Cracks and Patching

1. Cracks in concrete components which are judged to affect the structural integrity of the building will be rejected.
2. Small holes, depressions and air voids shall be patched with a suitable material. The patch shall match the color, finish and texture or the surrounding surface.
3. Patching shall not be allowed on defective areas if the structural integrity of the building is affected.

E. Curing and Hardening Concrete

1. Concrete surfaces shall not be allowed to dry out from exposure to hot, dry weather during initial curing period.

PART 4 FINISHING AND FABRICATION

1. GENERAL

A. Structural Joints

1. Wall components shall be joined together with two welded plate pairs at each joint. Each weld plate will be 6-inch long and located one pair in the top quarter and one pair in the bottom quarter or the seam. Weld plates shall be anchored into the concrete panel and welded together with a continuous weld. The inside seams shall be a paintable caulk. The outside seams shall use a caulk in a coordinating building color or clear.
2. Walls and roof shall be joined with weld plates, 3-inch x 6-inch, at each building corner.
3. The joint between the floor slab and walls shall be joined with a grout mixture on the inside, a matched colored caulk on the outside and two weld plates 6-inch long per wall.

B. Painting/Staining

1. An appropriate curing time shall be allowed before paint is applied to concrete.
2. Some applications may require acid etching. A 30% solution of hydrochloric acid shall be used, flushed with water and allowed to thoroughly air dry.
3. Painting shall not be done outside in cold, frosty or damp weather.
4. Painting shall not be done outside in winter unless the temperature is 50 degrees Fahrenheit or higher.
5. Painting shall not be done in dusty areas
6. Schedule of finishes
   a. Inside Concrete Surfaces
      1) Inside floors shall be 1 coat of 1-part water based epoxy with a silica sand suspension to provide uniform texture.
      2) Interior walls and ceilings shall be 2 coats of a modified acrylic penetrating pigment, followed by 1 coat of clear sealer.
   b. Metal Surfaces both Inside and Out
      1) 2 coats of DTM enamel
   c. Exterior Concrete Surfaces
      1) Exterior walls shall be 2 coats of pure acrylic water repellent penetrating stain in the same color as the walls or roof followed by 1 coat or clear acrylic anti-graffiti sealer.

PART 5 TESTING

1. GENERAL

A. The following tests shall be performed on concrete used in the manufacture of buildings. Testing shall only be performed by qualified individuals who have been certified ACI Technician Grade 1. Sampling will be in accordance with ASTM C172.

1. The air content of the concrete shall be checked per ASTM C231 on the first batch of concrete. The air content shall be in the range of 4.5% +/- 1.75%.
2. The compressive strength of the cylinders shall be tested to ASTM C39. Cylinders shall be provided as follows; one (1) cylinder for release, one (1) for 7

days and one (1) for 28 days. The release must be a minimum strength of 2500 psi, the 7 day must be a minimum of 4000 psi and the 28 day must be a minimum of 5000 psi.

PART 6 INSTALLATION

1. GENERAL

A. Install the building level and plumb in accordance with manufacturer's recommendations.

END OF SECTION 03/720

SECTION 11/150

CAMPSITE EQUIPMENT

PART 1 GENERAL

1. WORK INCLUDED

   A. This section includes picnic tables and fire rings.

2. SUBMITTALS

   A. The **CONTRACTOR** shall provide the following information for each item specified:

      1. Provide manufacturers' catalog information, material and component specifications, dimensioned drawings, weight, and installation instructions.

PART 2 PRODUCTS

1. PICNIC TABLES

   A. Picnic tables shall be ADA accessible with 6-foot long seats and an 8-foot long table top that extends 2-feet beyond the bench seats in one direction. Frames shall be constructed of 2-inch nominal diameter steel pipe and 2-inch x 2-inch x 3/16-inch structural grade steel angle made of A36 steel. Bracing shall be smaller steel pipe and channels as necessary. Frame shall include stabilizing outriggers to prevent tipping toward the 2-foot table extension.

   B. All frames and braces shall be hot dipped galvanized to meet ASTM -A123.

   C. Bench and table tops shall be untreated #1 grade Southern Yellow Pine, 2-inch x 10-inch nominal dimension lumber, all edges shall be 3/8-inch radius.

   D. Provide wheel chair clearance of 30-inches wide, 27-inches of vertical clearance under table top, and 24-inches total of knee and toe clearance.

   E. Picnic tables shall be as manufactured by Pilot Rock, model XT/G-6UP/E or approved equal.

2. STANDARD FIRE RING

   A. Fire rings shall be 32-inch overall diameter. Ring shall be constructed of 3/16" steel with a formed 1-inch flanged lip around the top of the ring. The ring shall be 9-inches high with 1-inch diameter draft holes spaced around the bottom perimeter.

B. The 270 square inch grate shall be constructed of 5/8-inch steel bars around the perimeter, 3/4-inch steel bar handles and 1/2-inch steel bars for the grate surface. All steel to be A36.

C. The grate shall be secured to the fire ring with two 3/4-inch A36 steel vertical bars that allow 7-inches of vertical grate adjustment.

D. Grate shall be provided with two grate adjustment handles that remains outside the fire ring in all positions.

E. Rings shall be anchored in two places with1/2-inch diameter steel "U" anchor pins cast into cast in place concrete footings. The fire rings shall rotate around the anchor pin to allow it to be tipped up for cleaning.

F. Fire rings shall be finished in high temperature, heat resistant, nontoxic black enamel.

G. Fire Rings shall be as manufactured by Pilot Rock, model FA-30/9/TB or approved equal.

3. ADA FIRE RING

A. Fire rings shall be 32-inch overall diameter, "D" shaped. Ring shall be constructed of 3/16" steel with a formed 1-inch flanged lip around the top of the ring. The ring shall be 16-3/8-inches high with ten 9/16-inch diameter draft holes spaced around the bottom perimeter.

B. The 300 square inch grate shall be constructed of 1/2-inch steel bars with a one-piece wrap around perimeter bar. The grate shall be welded to two 5/8-inch steel bars that extend to spring grip style handles. All steel to be A36.

C. Grate handles shall slide in die punched vertical slots designed to adjust grate to 4 heights between 19-inches and 24-inches above ground.

D. Rings shall be anchored in three places with1/2-inch diameter steel "U" anchor pins cast into cast in place concrete footings.

E. Fire rings shall be finished in high temperature, heat resistant, nontoxic black enamel.

F. Fire Rings shall be as manufactured by Pilot Rock, model FA-30/9/TB or approved equal.

G. Provide gravel to fill level of 10 3/8-inches above ground inside the fire ring.

PART 3 EXECUTION

1. GENERAL

   A. Install all equipment in compliance with manufacturer's recommendation and the project drawings.

END OF SECTION 11/150

SECTION 11/720

FRP POTABLE WATER TANK

PART 1 GENERAL

1. WORK INCLUDED

   A. This specification covers the provision and installation of a single wall FRP water storage tank with appurtenances.

   B. See also the Plumbing Section of these Specifications for domestic water piping and appurtenance requirements of the domestic water system.

   C. See also the General Equipment Stipulations Section of these Specifications for other requirements for the tank.

2. SUBMITTALS

   A. Submittals for the tank shall conform to the General Equipment Stipulations Section of these Specifications.

   B. References herein to manufacturer's name and model are intended to establish a level of quality for those items. Products of alternate manufacturers will be considered, subject to compliance with the specification requirements herein and the requirements for Submittal review.

PART 2 MATERIALS

1. GENERAL

   A. The tank manufacturer shall be list by NSF under NSF/ANSI Standard 61

   B. Tank shall conform to the requirements of AWWA D120-02, Thermosetting Fiberglass-Reinforced Plastic Tanks.

   C. The tank shall be as manufactured by Xerxes Corporation or **ENGINEER** approved equal.

2. TANK CHARACTERISTICS

   A. Loading conditions:
      1. Internal Load – all potable tanks shall be testable and shall withstand a 5 psig air-pressure test with 5:1 safety factor. Maximum test pressure is 5 psig.
      2. Surface Loads – tanks shall be designed withstand H-20 and HS-20 axle loads when properly installed in accordance with the current installation manual.
      3. External Hydrostatic Pressure and Burial Depth – Tank shall be capable of withstanding the loadings induced by being buried in the ground 7.0-feet over the top of the tank, with the whole fully flooded and maintain a 5:1 safety factor against buckling.

4. The tank shall support all accessory equipment including manways, manway extensions, inlet and outlet penetrations and ladders.
5. Buried tanks shall be manufactured with integral trapezoidal ribs for structural integrity.

B. Tank shall be capable of handling potable water for domestic use at ambient temperature.

C. Materials:
1. Tank shall be manufactured with 100% premium resin and chopped glass. No fillers of extenders will be used.
2. No General , Orthphthalic, or odd lot resin will be used.
3. All exposed internal FRP components to be constructed using SNSF listed materials.

D. Dimensions and Capability:
1. Tank shall have a nominal working capacity of 2000 gallons.
2. Tank shall have a nominal outside diameter of 6.0 feet.
3. Tanks shall weigh approximately 1000 lbs.

E. Accessories:
1. Manway openings shall be FRP and flanged.
2. Manway extensions shall be FRP
3. Hatches shall be watertight, hinged, lockable and shall overlap the manway opening a minimum 2-inches.
4. Nozzles shall be flat faced, and fitted with a 150# flange.
5. Treaded fittings shall be constructed of FRP, or 304 Stainless Steel.
6. Lifting lugs shall be capable of withstanding the weight of the tank with a safety factor of at least 2:1.
7. The tank shall be anchored to prevent flotation. The anchoring system shall include FRP anchor straps provided by the tank manufacturer and pre-cast concrete deadmen. Deadmen may be provided by the tank manufacturer or precast locally by a concrete precast company.
8. Ladder shall be FRP.
9. All accessories exposed in the interior of the tank shall be listed under ANSI/NSF Standard 61.

PART 3 EXECUTION

A. The tank shall be tested in accordance with the tank manufacturer's current installation manual.

B. The tank shall be disinfected in accordance with AWWA Standard C652. At least two successive sets of samples taken 24 hours apart, must be tested and found to meet microbiological requirements.

C. The tank shall be hydrostatically tested in accordance with AWWA D120, 5.2.3.1 as follows. Attach a 4-inch diameter standpipe to the tank that extends 4-feet above the top of the tank. Fill the tank and standpipe with water and let it stand for 24 hours. Examine for leakage or drop in water elevation in the standpipe. The tank shall how no visible signs of leakage, and the water level shall not fall more than 0.5-inches within the 24-hour test period. Testing shall

be witnessed by the Engineer, the Contractor shall coordinate scheduling the testing time.

D. The tank shall be installed in accordance with the tank manufacturer's current installation manual.

END OF SECTION 11/720

SECTION 11/750

WATER SYSTEM COMPONENTS

PART 1 GENERAL

1. WORK INCLUDED

A. This specification covers the provision and installation of a new shallow well jet pump and controls. This pump will pressurize the water system.

B. This specification includes the control modifications for the existing well pump that will supply water to the new cistern.

C. This specification includes the installation of an aeration system consisting of a recirculation pump for aeration and ventilation equipment. The purpose of the aeration system is to remove methane gas.

D. See also the Plumbing Section of these Specifications for domestic water piping and appurtenance requirements of the domestic water system

E. See also the Electrical Section of these Specifications for primary power, wiring, and disconnect requirements for the new well pump.

F. See also the General Equipment Stipulations Section of these Specifications for other requirements of the new well pump, motor, and controls.

2. SUBMITTALS

A. Submittals for the well pump, motor, and controls shall conform to the requirements of the General Equipment Stipulations Section of these Specifications.

B. Submittal data for the new pump shall include:

1. Pump performance curve showing flow, TDH, horsepower demand, pump efficiency, and net positive suction head (NPSH) over the entire operating range of the pump, including shutoff head and manufacturer's recommended maximum head-capacity condition for operation.

2. Manufacturer's suction requirements for pump.

3. Cut-away drawing showing pump assembly and components.

4. Dimensional drawing showing pump configuration, overall length, point of water intake, and discharge pipe connection size and location.

5. Materials of construction for all pump components.

6. Pump motor electrical characteristics, horsepower, and service factor.

7. Pump motor electrical connection and required power cable details and materials.

8. Pump motor construction materials and insulation.

9. Electrical characteristics and ratings, manufacturer's specifications, installation/adjustment instructions, and dimensions and mounting requirements for pressure switch, pump control box (including magnetic starter and heaters), and lightning arrestor. Also required is written statement from pump manufacturer/vendor for compatibility of controls for use with pump.

10. Manufacturer's O&M Manual for pump, including Installation Instructions.

11. Manufacturer's statement of Warranty for pump and motor.

12. Address and phone number of nearest manufacturer's certified service center for pump and motor.

C. References herein to manufacturer's name and model for pumps, motors, and controls are intended to establish a level of quality for those items. Products of alternate manufacturers will be considered, subject to compliance with the specification requirements herein and the requirements for Submittal review.

3. ELECTRICAL

A. Pump motor, controls, and wiring shall be in full accordance with the NEC and the requirements of the Electrical Section of these Specifications. Consult Electrical Drawings for primary power and disconnect requirements and locations for pump and control equipment.

PART 2 MATERIALS

1. GENERAL

A. Pump and motor shall be furnished complete with all accessories and appurtenances for a complete and functional installation, including motor leads, connectors, and cabling.

B. The pump and motor manufacturer's standard lightning arrestor shall be provided with the equipment.

2. SUPPLY JET PUMP AND MOTOR CHARACTERISTICS

A. New shallow well jet pump and motor shall meet the following operating conditions:

1.	Ground surface elevation	3300' MSL
2.	Water temperature range	40 to 70 degrees F
3.	Suction Lift	4 to 10 feet
4.	Design flow rate at TDH	17 gpm at 102' TDH

5.	Rotating speed	3500 rpm (± 100 rpm)
6.	Motor type	Built in overload with automatic reset
7.	Motor horsepower	1.0 hp
8.	Motor electrical characteristics	230 VAC, 60 Hz, 1-phase
9.	Motor service factor	1.15
10.	Pump certifications	NSF standard 61, UL 778 listed

B. Pump and motor materials shall comply with the following:

1.	Impellers	*Noryl* or glass-filled composite
2.	Motor certification	UL 778 recognized
3.	Pump and motor warranty	one-year

C. Pump and motor configuration shall meet the following:

1.	Suction connection	1-1/4" NPT
2.	Discharge Connection	1" NPT

D. Manufacturer's reference:

1. Pump shall be *Gould Pump J10S*, or equal

E. Pump priming:

1. Pump shall have the ability to reprime itself after initial priming is lost even with air in the system.

F. Integral Pressure Switch:

1. Pump shall include an integral pressure switch adjustable over a standard 40 to 60 psi range, with a maximum cut-out of 80 psi. Pressure switch shall have a ¼" FIPT connection, and shall be furnished with a stainless steel ¼" quarter-turn isolation ball valve. Pressure switch shall be 230V, 1-phase, and shall be *CentriPro AS4* as manufactured by *Square D*, or equal.

3. RECYCLE SYSTEM JET PUMP AND MOTOR CHARACTERISTICS

A. New shallow well jet pump and motor shall meet the following operating conditions:

1.	Ground surface elevation	3300' MSL
2.	Water temperature range	40 to 70 degrees F

3.	Suction Lift	4 to 10 feet
4.	Design flow rate at TDH	8 gpm at 102’ TDH
5.	Rotating speed	3500 rpm (± 100 rpm)
6.	Motor type	Built in overload with automatic reset
7.	Motor horsepower	0.5 hp
8.	Motor electrical characteristics	230 VAC, 60 Hz, 1-phase
9.	Motor service factor	1.15
10.	Pump certifications	NSF standard 61, UL 778 listed

B. Pump and motor materials shall comply with the following:

1.	Impellers	*Noryl* or glass-filled composite
2.	Motor certification	UL 778 recognized
3.	Pump and motor warranty	one-year

C. Pump and motor configuration shall meet the following:

1.	Suction connection	1-1/4” NPT
2.	Discharge Connection	1” NPT

D. Manufacturer’s reference:

1. Pump shall be *Gould Pump J5S,* or equal

E. Pump priming:

1. Pump shall have the ability to reprime itself after initial priming is lost even with air in the system.

F. Integral Pressure Switch:

1. Integral Pressure Switch is not required.

4. INLINE FAN

A. Inline fan shall meet the following operating requirements:

1. Fan shall meet the requirements of class 1, division 2, groups B,C,D for hazardous locations.

2. Fan shall be of spark proof construction.

3. Fan housing shall be UV protected thermoplastic resin.

4. Fan shall be rated for outdoor installation.

5. Include manufacturer's standard bracket for outdoor mounting.

6. Fan shall be sized for 6" duct.

7. Motor electrical characteristics 115 VAC, 60 Hz, 1-phase

8. Rotating speed 2750 rpm (± 100 rpm)

B. Manufacturer's reference:

1. Inline fan shall be *Marc Climate Controls, Inc, ISFX Series,* or equal

5. EXISTING WELL AND RECIRCULATING PUMP CONTROLS

A. Control panel shall be designed to control two pumps:
1. An existing well pump shall be operated based on signals from float switches for pump on and pump off water levels.
2. A jet pump for aeration of the water by an adjustable repeat cycle timer. The repeat cycle timer shall allow adjustment of the length of both the pump-on and pump-off cycle times. The timer shall also operate an exhaust fan to enhance ventilation in the headspace of the tank during aeration.

B. Panels shall be repairable in the field without the use of soldering irons or substantial disassembly.

C. Panel shall include the following features:
1. Hand-off-auto (HOA) switch for automatic or manual control for each pump and the exhaust fan.
2. Main disconnect to isolate power from the panel.
3. Circuit breaker and contactor for each pump and exhaust fan.
4. Ground lug
5. Circuits for all floats shall be intrinsically safe.
6. Audible Alarm: minimum of 80 db sound pressure at 24-inches, warble tone.
7. Visual Alarm: NEMA 4X rated, mount on exterior of building in visible location for indoor installations.
8. Test/alarm silence relay
9. Enclosure: NEMA 4X with lockable latch
10. Lighting Protection
11. Alarm Conditions to include:
    a. Pump failure
    b. High water
    c. Low water

D. Control panels shall be as manufactured by *Alderon Industries* or **ENGINEER** approved equal.

2. FLOAT SWITCHES

A. Float switches shall be tilt sensitive, narrow angle float switches which are sealed in a non-corrosive PVC housing. Switches shall be UL 508 listed for water and sewage and CSA certified and shall include a minimum 16 gauge flexible cable. Cable lengths shall extended between the floats and control panel with no splicing. Float switches shall be as manufactured by *Alderon Industries* or **ENGINEER** approved equal.

PART 3 EXECUTION

1. GENERAL

A. Jet pump/motor assembly and controls shall be installed in full accordance with the manufacturer's recommendations. Manufacturer's O&M Manual including installation instructions shall be available for the well pump and controls, prior to installation.

B. All electrical wiring, including grounding requirements, for the pump and controls shall meet NEC requirements, and the Electrical Section of these Specifications.

A. The Contractor shall conduct a functional test in the presence of the Engineer, once the pump is set and all controls are operational. The test shall include operating the pump through a minimum of ten start-stop cycles, purging water from yard piping hydrants as necessary to induce a pressure drop and prompt the system to automatically start and stop. Pump motor amperage draw shall be checked by the Contractor during operation, and equipment shall be monitored for quiet operation, proper function, and satisfactory performance. Pump discharge pressure shall be monitored by the Contractor during pump operation at a tap identified by the Engineer, and flow measurements by "timed bucket test" shall be conducted at a system outlet identified by the Engineer. Any deficiencies in performance shall be remedied by the Contractor, and a function test repeated.

6. WARRANTY

A. The pump and motor one-year warranty period shall commence at the substantial completion date for the entire project and will end one year after the final acceptance date.

END OF SECTION 11/750

SECTION 15/200

PLUMBING

PART 1 GENERAL

1. WORK INCLUDED

A. This section covers the work necessary to furnish and install piping, fixtures, appliances, equipment, and appurtenances for complete and functional plumbing systems as indicated in the Drawings and specified herein.

B. Work included in this section is as follows:

1. Piping and valves for both indoor and outdoor buried service.

2. GENERAL

A. The drawings do not show all details of all piping systems, and instead only portray the functionality required. The **CONTRACTOR** shall provide all accessories, adapters, appurtenances and supports to achieve a complete and functional installation. The **CONTRACTOR** shall verify all piping routings and locating dimensions shown for conflicts with other piping or utilities, and shall provide any offsets required to achieve clearance at no additional cost to the **OWNER**. In the event changes to the locations of equipment or piping shown are necessary, the **CONTRACTOR** shall submit such changes in writing to the **ENGINEER** before proceeding with such changes.

B. All fixtures and appliances shall be installed in complete accordance with the manufacturer's recommendations and requirements, including structural support and venting.

C. Manufacturers' references are included herein for reference and to establish the required level of quality; "or equal" products may be proposed subject to the requirements for Submittal review.

3. CODES, PERMITS AND COMPLIANCE

A. Plumbing under these Specifications shall conform to all requirements of the current editions of the UPC, IBC, UFC, DEQ Circulars and all other codes, standards and ordinances applicable to work. In event of conflicts between these Specifications and applicable codes or standards, the codes and standards shall govern.

B. All piping, fixtures, and accessories shall be installed in strict accordance with the laws and regulations of the State of Montana and Broadwater County.

C. Any permits legally required for the work under these Specifications shall be the responsibility of the **CONTRACTOR** to obtain. Costs of such permits and scheduling

of any inspections required in conjunction with such permits or associated requirements shall be the responsibility of the **CONTRACTOR**.

D. Completed piping systems shall be tested by the **CONTRACTOR** in accordance with all applicable codes and standards before charging such piping.

4. SUBMITTALS

A. The **CONTRACTOR** shall provide the following information:

1. Fixtures and Appliances – Provide manufacturers' catalog information, photographs, material and component specifications, fully dimensioned drawings, weight, support requirements, storage and installation instructions, and operating manual.

2. Exposed Piping Systems – Provide manufacturers' catalog information, material specifications, dimensions, and ratings.

3. Pipe Fittings and Appurtenances – Provide manufacturers' catalog information, material specifications, dimensions and ratings.

4. Buried Piping Systems - Provide manufacturers' catalog information, material specifications, dimensions, and ratings.

5. Pipe Supports – Provide manufacturers' catalog information, material specifications, dimensions, load ratings, recommended spacing, and types and arrangement of fasteners, including substrate requirements.

PART 2 PRODUCTS

1. GENERAL

A. Like items of material provided under these Specifications shall be the product of one manufacturer.

2. GALVANIZED STEEL PIPE AND FITTINGS

A. Galvanized steel piping for the Utility Building and shall be carbon steel, Schedule 40, meeting ASTM A120, ASTM A53 Grade B, or ASTM A106 Grade B.

B. Galvanized steel pipe fittings and joints shall be screwed. Fittings shall be Schedule 40, galvanized, meeting ASTM A196 or ASTM A47. Fitting dimensions shall conform to ANSI B16.3. Unions shall be 300-pound malleable iron, galvanized, with brass to iron seats.

C. Thread lubricant for galvanized steel pipe shall be *Teflon* tape or joint compound insoluble in water.

3. PLUMBING PIPE SUPPORTS AND ACCESSORIES

A. Wall-mounted pipe supports for lines 1½-inch and smaller shall be one-hole, clamp type, and shall be *Anvil/Grinnell Figure 126*, or **ENGINEER** approved equal.

B. Wall-mounted pipe supports for lines larger than 1½-inch shall be welded steel, heavy duty clamp type, and shall be *Anvil/Grinnell Figure 199*, or **ENGINEER** approved equal.

C. Hanger pipe supports shall be cradle type with hanger rods and clevises, and shall be *Anvil/Grinnell Figure 104* or *Figure 260*, or **ENGINEER** approved equal.

D. Floor Mounted Pipe Supports shall be offset clamp type, and shall be *Anvil/Grinnell Figure 103,* or **ENGINEER** approved equal. If required a section of structural steel channel or tubing may be used to vertically adjust the height of the support. The structural steel shall be anchored to the floor using ¼-inch stainless steel anchor bolts.

E. Fasteners for pipe clamps and hangers shall be as recommended by the support manufacturer, and shall be suitable for proper anchorage to the substrate material to which attached. Fasteners shall be galvanized steel.

4. HDPE PIPE AND FITTINGS FOR BURIED SERVICE

A. High density polyethylene pipe (HDPE) for buried domestic water well supply and yard piping shall be NSF listed. HDPE pipe shall be iron pipe size with 200 psi pressure rating at 73.4 degrees F, with a minimum hydrostatic burst pressure of 630 psi. Pipe shall have an SDR of 9, based on inside diameter controlled dimensions. Pipe shall meet ASTM D2239 and AWWA C901. HPDE pipe shall be formulated from 3408 polyethylene resin, and extruded. The exterior of HDPE pipe shall be permanently marked with size, SDR, operating pressure, date of manufacture, and NSF logo. Pipe shall have a 25-year warranty from the manufacturer, and shall be *Endot Industries Endopoly PE 3408*, or **ENGINEER** approved equal.

B. Fittings for buried HDPE piping shall be gray Schedule 80 PVC with insert-by-insert or insert-by-NPT ends. Each insert connection shall each be secured with dual ½" minimum width stainless steel hose clamps meeting pipe and fitting manufacturers' recommendations.

5. GATE VALVES – WATER SERVICE

A. Interior gate valves for 2-inch and smaller hot and cold water service shall be all bronze, rising stem type, with graphite-impregnated *Aramid* packing and aluminum handwheel operators. Valves shall be Class 125, rated for 200-pound WOG, and shall have threaded ends. Valves shall be *Nibco Series T111*, or **ENGINEER** approved equal.

6. DOLE VALVE

A. Dole valves shall be brass body with iron pipe threads end entry. Valves shall be designed to limit flow to 8 gpm and rated for 125 psi. Dole valves shall be *Dole GX flow control valves* or **ENGINEER** approved equal.

7. FOOT VALVE

A. Foot valves shall be brass body, with stainless steel screen and cap, rated for 200 psi WOG. Foot valves shall be *Campbell FV-8* or **ENGINEER** approved equal.

8. CHECK VALVE

A. Check valves for interior service shall be bronze, silent check with female NTP end entry and rated for 400 psi. Valves shall be *Watts series 600* or **ENGINEER** approved equal.

9. CURB VALVES – WATER SERVICE

A. Curb valve for buried water service shall be brass ball valves with compression connections suitable for use with HDPE pipe and Minneapolis pattern top threads. Valves shall be rated 300-pound WOG, and shall meet the requirements of AWWA C800. Valves shall be *Mueller B-25211 ball curb valve*, or **ENGINEER** approved equal.

B. Curb boxes shall be cast iron construction, Minneapolis pattern, and allow height adjustment between 78 and 66-inches. The curb box shall include a lid with plug. Curb boxes shall be *Mueller H-10300* or ENGINEER approved equal. Two keys will be provided to the Owner for opening and closing the valves.

10. STOP/DRAIN VALVES – WATER SERVICE

A. Curb valve for buried water service shall be brass ball valves with compression connections suitable for use with HDPE pipe and Minneapolis pattern top threads. Valves shall be rated 300-pound WOG, and shall meet the requirements of AWWA C800. Valves shall be *Mueller B-10288 drain valve*, or **ENGINEER** approved equal.

B. Curb boxes shall be cast iron construction, Minneapolis pattern, and allow height adjustment between 78 and 66-inches. The curb box shall include a lid with plug. Curb boxes shall be *Mueller H-10300* or ENGINEER approved equal.

11. ADA HYDRANTS

A. Yard hydrants shall be post-type hydrants with ADA operating lever and riser suitable for 6-foot bury depth. The hydrant will include a separate diverter spout and hose connection with a double check backflow preventor. Hydrants shall include a reservoir to store water below the frost line between uses to prevent freezing. Hydrants shall meet ADA requirements for height and hydrant operating force. ADA hydrants shall be *Woodford model S4H*, or **ENGINEER** approved equal.

12. PRESSURE GAUGE

A. Gauges shall be Bourdon tube type actuated pressure gauges. Gauges shall be stem mounted with 2-1/2-inch dial face size, unless otherwise noted. Scale range shall be 0 to 100 psi and accuracy shall be plus or minus 3 percent of span.

B. The sensing element shall be phosphor-bronze, unless otherwise noted. Gauge casings shall be stainless steel.

C. Gauges shall be as Ashcroft 1008A/AL or an **ENGINEER** approved equal.

PART 3 EXECUTION

1. GENERAL

A. All plumbing and installation of piping, appurtenances, and fixtures shall fully conform to the current edition of the *Uniform Plumbing Code* (UPC), and all applicable state and local regulations. All work shall be approved by the State Plumbing Inspector.

B. Drawings do not attempt to show the exact details of all piping. No extra payment will be allowed for fittings, adapters, appurtenances, clearances or offsets required to complete the Work. Changes in locations of equipment or piping, contemplated by the **CONTRACTOR**, must be submitted to the **ENGINEER** in writing, and cannot be executed without the **ENGINEER'S** approval. All work shall be completed to provide a fully functional installation as shown and specified.

C. Unions shall be provided in piping systems where shown, and adjacent fixtures and appliances where necessary to assure proper alignment without stressing piping members of fixture connections. Insulating (dielectric) unions shall be provided on domestic hot and cold water piping at all connections between steel and copper (or brass) piping and for all connections to electrically powered appliances.

D. Plumbing fixtures shall be plumbed, trapped, and vented as required by UPC, and as shown. In the event of conflicts between the plumbing requirements shown and UPC, requirements of the Code shall take precedence.

2. PIPING

A. Piping runs shall be level and plumb, except where slopes are specifically called or shown.

B. Pipes shall be adequately supported by clamps or hangers at intervals not to exceed 10-feet, and either side of all changes in direction. Where additional supports may be needed to provide pipe stability, they shall be provided at no additional cost.

C. All piping intended to carry potable water shall be disinfected before placing into service. Disinfection procedures shall conform to AWWA C651.

D. All piping systems installed under this section do not require painting or coating.

E. Buried HDPE yard piping and fittings for domestic water service shall be installed in accordance with AWWA C901 and ASTM D2774. A minimum of 6-inch of pipe bedding shall be placed on all sides of buried HDPE hard piping.

3. YARD HYDRANTS

A. Yard hydrants shall be plumbed and adjusted to 34-inch height above grade. Yard hydrant connections shall utilize insert-by-IPT (male) adapters to connect to HDPE yard piping. Drain ports on yard hydrants shall be provided with a minimum of one cubic foot of 2-inch nominal diameter washed rock, centered on the drain.

4. TESTING

A. Completed cold water piping, including fixture connections shall be tested and demonstrated to be leak free by the **CONTRACTOR** by charging with water and maintaining 60 psi pressure, in the presence of the **ENGINEER**. Any leaks or defects shown shall be promptly remedied by the **CONTRACTOR**.

B. Other tests of completed piping as prescribed by the UPC shall also fully apply, and shall be conducted in the presence of the **ENGINEER**.

END OF SECTION 15/200

DIVISION 16 – ELECTRICAL

16000 – GENERAL PROVISIONS

A. SCOPE
   1. This section supplements all sections of this division and applies to all phases of work hereinafter specified and required to provide a complete installation of electrical systems.

B. WORK INCLUDED
   1. The Contractor is responsible for providing a complete and operating electrical system.
   2. The Contractor shall provide all labor, materials, and equipment as listed, shown, scheduled, or mentioned on the drawings and/or specified including all incidentals, operations, methods and skilled supervision required for a complete installation.

C. COORDINATION OF WORK
   1. Examine the drawings and specifications including the general, mechanical and work of other trades and coordinate all work so that it proceeds with a minimum of interference between trades.
   2. Check locations of lights, panelboards, equipment, piping, ducts, etc., to predetermine that all work clears openings, structural members, cabinets, ducts, piping, and other work or equipment having fixed locations.

D. RESPONSIBILITY
   1. The contractor is responsible for the installation of a complete piece of work in accordance with true intent of drawings and specifications.
   2. Consult all drawings of each contract to predetermine that the work and equipment will fit as planned.
   3. If, at any time, and in any case, change in location of lights, outlets, equipment, panels, etc., becomes necessary due to obstacles or installation of other trades as shown on any of the project drawings, such required changes shall be made by Contractor at no extra cost.

E. CODES, FEES, PERMITS, AND REGULATIONS
   1. Obtain and arrange for all permits, easements, licenses, and inspections required for work in this contract.
   2. All costs for required permits, easements, licenses, and inspections are the responsibility of the Contractor and are to be included in his bid.
   3. Costs Charged by the Electric Utility Company for their related work will be billed direct to the Owner, do not include in bid price.
   4. Comply with the National Electrical Code, State of Montana Electrical Code, National Electrical Safety Code; and all local, county, state, and federal codes, regulations, and ordinances.

F. INTENT OF DRAWINGS
   1. Drawings are partially diagrammatic, and do not necessarily show exact location of conduit, outlets, etc.
   2. Riser diagrams are schematic only, not to scale, and do not necessarily show physical arrangement of equipment.

G. APPLICABLE DOCUMENTS
   1. Design, manufacture, testing, and method of installation of all apparatus and materials furnished shall conform to the latest applicable publications or standard rules referenced.
   2. Manufactured materials and equipment shall be installed and connected as directed by manufacturer unless noted otherwise herein or on the drawings.

H. WORKMANSHIP
   1. Work under this contract shall be performed only by craftsmen skilled in the particular trades necessary to provide a complete installation.
   2. Install equipment in a neat and workmanlike manner, level and adjust for satisfactory operation. Install equipment so that all parts are easily accessible for inspection, operation, maintenance and repair. Align boxes vertically and horizontally to Engineer's satisfaction.
   3. All work, materials, and equipment are subject to inspection at any time by the A/E or his representative. The Engineer decides whether work is satisfactory. The Contractor shall replace materials or equipment not properly installed or finished, without any increase in payment received.

I. MOUNTING HEIGHTS
   1. Work lines and established heights shall be in accordance with the drawings and specifications insofar as they extend. Verify all dimensions shown, and establish all elevations and detailed dimensions not shown. Maintain all code-required clearances around electrical equipment.
   2. Unless specifically noted otherwise, establish the exact location of electrical equipment based on the actual dimensions of equipment furnished.

J. CUTTING, PATCHING, AND PAINTING

1. See requirements in the General and Special Conditions.
2. No cutting of structural members permitted without consent of Engineer in writing.
3. Sleeves or conduit fittings through floors, walls or ceilings shall be flush with floors, walls, or ceilings and sized to accommodate the raceway.
4. Where conduits penetrate waterproofed or fire-rated walls, floors, or ceilings, provide UL listed fittings and seals. Conduits penetrating the mechanical room floor slab where practical are to be grouped, provided with a concrete curb or housekeeping pad above the floor slab level and provided with waterproof seal fittings.
5. All openings through floor slabs, masonry partitions or walls, and continuous partitions are to be caulked with non-flammable sealant to provide a water tight and airtight seal.
6. Properly protect all apparatus, fixtures, appliances, material, equipment, and installation from damage of any kind. The A/E may reject any particular piece or pieces of material, apparatus, or equipment scratched, dented, or otherwise damaged. Where marring or disfigurements have occurred, replace or refinish the damaged surfaces to the satisfaction of the A/E. Painting must match adjoining color within a reasonable degree, or Contractor must repaint that portion until a close match is obtained. Materials used must be approved by A/E. Electrical contractor shall patch and repair all ceilings and walls he damages to the A/E's satisfaction.

K. SUPPLEMENTARY FRAMING AND HOUSEKEEPING PADS

1. Provide the design, fabrication, and erection of supplementary structural framing required for attachment of hangers or other devices supporting electrical equipment.
2. Provide framing members of standard rolled A-36 steel shapes, designed for their actual loads with allowable stresses specified by AISC. Members shall be designed without excessive deflection and with consideration for rigidity under vibration, in accordance with standard structural practices.
3. When suspending transformers or similar vibrating equipment, provide vibration isolators to isolate vibration from structural members.
4. Provide housekeeping pads where shown on plans. Size as noted or shown. Electrical contractor shall hire general contractor to install pads. This also includes the pad for the main pad mounted transformer.

L. SEALING AND RUST PREVENTION

1. Seal equipment or components exposed to the weather and make watertight and insect-proof. Protect equipment outlets and conduit openings with temporary plugs or caps at all times.
2. Provide hot dip galvanized components for all ferrous materials that are exposed to the weather.

M. NOISE CONTROL
   1. All noise-producing devices similar to transformers, contactors, starters, etc., shall be mounted in such a manner as to effectively prevent the transmission of noise to an occupied space.
   2. Ballasts, transformers, contactors, starters, and similar equipment found to be noticeably noisier than other similar equipment on the project shall be replaced or repaired satisfactorily by the Contractor.

N. EQUIPMENT NAMEPLATES
   1. Provide Micarta nameplates (screwed to equipment) 1-inch wide or more with 1/2-inch letters identifying panel designation or equipment served and voltage; e.g., Panel H1, 277/480 volt, 3 Phase-4 Wire. Provide nameplates as follows:
      a. Safety switches, Starters, panel boards, feeder devices in MDP, and disconnect switches. Provide with black face and white letters.
      b. Main device in MDP shall be white face with red letters.
      c. Junction boxes and pull boxes over 100 square inches and all exposed junction or pull boxes shall be stenciled with black letters indicating system, voltage, and termination locations, e.g., Panel H1 Feeder, 277/480 volt, Switchboard to Panel H1.
   2. Plates for motor control devices in finished areas shall be engraved with name of devices controlled.

O. MECHANICAL WORK AND EQUIPMENT
   1. Make electrical provisions and connect up power to all equipment. Refer to General Specifications and Division 15 Mechanical and the drawings for interlocking, sequence of operations, and other information for rough-in, wiring, and connection of equipment, and the responsibility for such control wiring.

P. CLEANUP
   1. Upon completion of work, clean equipment of all dirt and debris, including light fixtures, lens, outlet boxes, interior spaces, etc. Clean site of all electrical scraps or debris.

Q. MATERIAL STORAGE AND DELIVERY
   1. Coordinate beforehand and provide for the handling and introduction of equipment into interior spaces of the building.
   2. Make provisions, which are acceptable to the Owner and Engineer, for delivery and storage of materials.

R. TEMPORARY ELECTRICAL
   1. See Special Conditions and/or Division 1.

S. TESTS
   1. Test all wiring and connections for shorts between conductors, shorts to ground, and for continuity prior to installation of fixtures and equipment.
   2. Perform an insulation resistance test on all feeder conductors installed under this contract, including neutrals, using a megohmeter. Minimum value shall be 100 megohm at 60 degrees F.
   3. Correct and retest any defects and submit data.

T. REMODELING WORK

1. Wherever existing electrical wire, conduit, controls, circuits, etc., are cut, removed, or interrupted as a result of the remodeling; all such items that serve areas or equipment that remain shall be rerouted, extended, relocated, etc., as necessary to maintain operation of equipment and services.
2. Downtime shall be held to a minimum, outages shall be scheduled at a time acceptable to and approved by the Owner. Consult with Owner in sufficient time for him to make necessary preparations for the outage.

W. AS-BUILT DRAWINGS

1. Maintain a separate set of electrical drawings at the job site at all times to be used as record drawings for the project. Show the location of all equipment or conduit installed other than as shown on the drawings. Indicate dimensions on all underground work referenced to established building lines.
2. Deliver As-built drawings to the Engineer at the completion of the job. This set of drawings shall be kept neat and clean.

X. BROCHURE OF EQUIPMENT

1. Deliver to the Engineer at the completion of the job a brochure of equipment containing installation, maintenance, and operating instructions for each piece of equipment, parts lists, wiring diagrams, and one copy of each shop drawing and catalog cut submitted. File in one or more three-ring binders of sufficient number to hold everything. File in appropriate divider headings for each type of equipment.
2. Provide a typewritten list in the front of the brochure which lists suppliers, with address and phone number, for each piece of equipment.
3. Brochure must be submitted and approved before final payment will be authorized.

Y. SHOP DRAWINGS AND APPROVALS

1. The materials, products and equipment described in the bidding documents establish a standard of required function, dimension, appearance and quality to be met by any proposed substitution.
2. No substitutions will be considered unless written request for approval has been submitted by the bidder and has been received by the engineer at least ten days prior to the original date for receipt of bids. Each such request shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitute including drawings, original cuts (not Xerox), performance and test data and any other information necessary for an evaluation. An incomplete drawing will not be reviewed. No correspondence will be returned. The burden of proof of the merit of the proposed substitute is upon the party proposing the substitution. The engineer's decision of approval or disapproval of the proposed substitution shall be final.
3. If the engineer approves any proposed substitution, such approval will be set forth in an addendum. Bidders shall not rely upon approvals made in any other manner.
4. Submittals shall be made as soon as possible after award of contract and prior to releasing equipment.

5. Contractor shall check submittals for number of copies, adequate identification, correctness and compliance with drawings and specifications. Shop drawings will be revised, changed, and/or resubmitted until acceptable and approved by the Engineer.
6. Approval of shop drawings and literature shall not relieve Contractor from responsibility for deviations from drawings or specifications, nor shall it relieve him from responsibility for errors in shop drawings or literature.
7. Copies must be legible and submitted in six copies for distribution as follows: Engineer – 2, Contractor – 4.
8. One copy of each approved shop drawing shall be retained by Contractor and bound in "Brochure of Equipment."
9. Submittals for each item must be complete: All submittals must be marked to show items to be provided. Partial or incomplete submittals will be rejected.
   a. Lighting Fixtures:
      Catalog cuts for light fixtures and lamps, catalog cuts and manufacturer's literature for emergency lighting units, catalog cuts for replacement lens data.
   b. Wiring Devices:
      Catalog cuts for all devices and plates.
   c. Fuses:
      Catalog cuts with sizes marked for which item, time-current curves for main, feeder and motor protective fuses.
   d. Main Distribution Panel and Panelboards:
      Shop drawings showing bus layout, breaker layout, bus size, lug size, voltage, phase, physical dimensions, and conduit entrance locations. Catalog cuts for OCPD's including frame or amp size, lug sizes, and device catalog numbers.
   e. Safety Switches:
      Shop drawings, showing electrical and physical sizes and characteristics, item each switch is to be used for, and catalog number.
   f. Motor Starters:
      Shop drawings showing electrical/physical characteristics and sizes, item each starter is used for, catalog number, accessories and options provided, replacement pilot light type and number.
   g. Miscellaneous Items:
      Shop drawings and/or catalog cuts with same basic information as items previously listed for any major items or pieces of equipment. Items such as transformers, contactors, relays, etc.

Z. GUARANTEE/WARRANTY

The Contractor shall warrant and guarantee all work done under Division 16 to be free from defects in material or workmanship- for a period of one year from the date of Final Acceptance of the Work. During the warranty period the Contractor will, at his own expense, repair and replace all defective materials and work, and all other work damaged as a result.

16110 – RACEWAYS AND FITTINGS

A. PRODUCTS

1. Rigid Steel Conduit (RGS): Conduit shall be hot-dipped, galvanized, zinc-coated with hot-dipped, galvanized threaded couplings and connectors. Conduit bushings shall be insulated. Grounding bushings shall be insulated with pressure type lugs.
2. Intermediate Grade Rigid Conduit (IMC): Conduit shall be galvanized zinc-coated with galvanized threaded couplings and connectors.
3. Flexible Liquid-Tight Metal Conduit: Conduit shall be zinc-coated, single-strip steel armor type with a Liquid-tight PVC covering. Flexible metal liquid-tight conduit shall have rain-tight steel fittings.
4. Rigid Schedule 80 PVC Conduit: Conduit shall be **Schedule 80** Heavy-Wall polyvinyl chloride conduit. Conduit shall conform to all provisions of the code, shall be UL listed for underground use, and rated for 90 deg C conductors. Fittings shall be as recommended by the manufacturer. **Schedule 40 PVC conduit is not acceptable and shall not be used.**

B. EXECUTION

1. General:
   a. Install all conductors in conduit. Conduit may be run exposed in pump rooms or similar spaces. All conduits shall be run parallel or perpendicular to building construction.
   b. Raceways in masonry walls, outdoors, exposed to weather, exposed outside, or subject to damage shall be RGS.
   c. Raceways in Class 1 locations shall be RGS
   d. Raceways in interior partitions, or exposed in interior spaces where not subject to damage shall be RGS or IMC
   e. Raceways in concrete, under concrete slabs, or underground shall be RGS or schedule 80 PVC, unless specifically noted otherwise. **PVC conduit is not allowed inside buildings – no exceptions. PVC conduit is not allowed exposed above grade – no exceptions.**
   f. PVC coated RGS elbows, or asphalt coated RGS elbows, shall always be used where elbows are required in PVC conduit runs. This includes where the raceway is turned up to go above grade. **All elbows installed in below grade conduit runs shall be large radius sweep elbows.**
   g. Install ground wire in all conduits.
   h. Secondary feed conduits from the service transformer to the Main Distribution Panel shall be RGS.
   i. All underground RGS conduit shall be PVC coated or asphalt coated. This includes conduit installed below concrete slabs.
   j. Final connections to all motors; transformers; equipment subject to vibration; and equipment in wet, damp, or outdoor locations shall be made with liquid-tight, flexible metal conduit with ground wire.

2. Continuity: Provide metallic conduit continuous between outlets, enclosures, and boxes. Secure conduit to all boxes and enclosures to provide electrical continuity. Provide approved fitting and bushing on terminals of metallic conduits.
3. Size: Provide conduit sizes in accordance with code for the size, type, and quantity of conductors installed unless larger conduit is indicated. Allow for internal ground wires in all conduits. All conduit and conductor sizes shown are based upon copper conductors with THW insulation. Hashmarks are not shown on plans for ground conductors. Ground wires are to be included in addition to the number of conductors indicated by the hashmarks.
4. Raceways Embedded in Concrete: Provide O.Z. type ZX, DX, or DXX expansion fittings on all conduits crossing expansion joints. Do not displace reinforcing steel to accommodate conduit or boxes. Do not install conduit directly under slabs resting on ground. Conduit in slabs shall be encased with 1 inch or more concrete and outside diameter shall not exceed one-third of slab thickness. Conduit installed under slabs shall have 6 inches or more compacted fill between conduit and slab.
5. Raceways Exposed: Run exposed raceways in straight lines; at right angles; or paralleled with walls, beams or columns.
6. Raceways Through Roof: Where raceways penetrate the roof seal, provide suitable pitch pockets or lead flashing and counter flashing.
7. Raceways Entering the Building Below Grade (Entrance Seal): Provide raceways with galvanized cast iron wall entrance seals having a watertight sealing gland assembly. Provide O.Z. type FSK thru-wall and floor seal fitting.
8. Supports: Support raceways by straps, suitable clamps, or hangers to provide a rigid installation. Do not support conduit from other pipe, or in a manner to prevent the ready removal of other pipe. Conduit supports shall be on intervals of 8 feet or closer as required for proper support and within 3 feet of boxes or fittings, or closer if required by code.
9. Joints and Connections:
    a. Metal Conduits: Make watertight all couplings and connections in threaded conduit. Cut all joints square, ream smooth, and properly thread. All connections in conduits are to be made with approved connectors. All box connections shall have a plastic bushing. Where double locknuts are used, provide one inside and one outside of the enclosure.
    b. PVC Conduits: Make all couplings and connections watertight. Utilize solvent cement approved by the conduit manufacturer for all couplings and fittings. Provide adapters and locknuts where conduit is attached to metal junction boxes, panels, etc. Provide expansion joints where recommended by the conduit manufacturer.
10. Protection: Cap raceways stubbed up immediately upon their installation with Ideal Conduloc spacer/cap fittings or O.Z. Push-Pull tab caps in cabinets or boxes.
11. Expansion Joints: Provide bonding jumpers for conduit crossing expansion joints. Where differential settlement may occur, use deflection fitting. Provide expansion fittings in raceways in accordance with manufacturer's recommendations.

13. Underground Conduits: Do not install conduit under or near structural footings unless approved by Engineer. Install raceways not less than 18 inches below finished grade unless encased in 2 inches or of more concrete. In areas of vehicular traffic, minimum depth shall be 24 inches.
14. General Location Requirements: Use care in locating raceways in close proximity to heating ducts and hot water lines. Where such crossings are unavoidable, clear covering of line by at least 6 inches. All raceway runs shown are diagrammatic. Determine exact locations in the field except where dimensions are shown.
15. Bends:
    a. Radius: Bends in conduit shall conform to code requirements.
    b. Number in Runs: Conduit shall not be installed with bends exceeding four of 90 degrees or its equivalent, 360 degrees total between pull boxes and/or fittings.
    c. How Made: Bends shall be made so as not to injure the conduit or effectively decrease its internal diameter. Bends in conduit of 1¼" or larger shall be made with manufactured mechanical benders, or factory-made ells shall be utilized. Heat shall not be applied.
16. Empty Conduit: Provide nonmetallic pull wire with a tensile strength of 200 lbs. Or more in every empty conduit.
17. Excavating and Trenching: Excavation and trenches for underground systems shall be excavated at least 4" below required depth. Fill bottom of trench with clean, crushed gravel or sand. After installation, fill side voids and up 4" over conduit with clean, crushed gravel or sand. Compact soil of backfill to original density to avoid settling of trench.

16120 – CONDUCTORS

A. PRODUCTS

1. Conductor Type

a. All Conductors: Conductors shall conform to UL, Fed. Spec. J-C30, and IPCEA as applicable. Provide recently manufactured cable with guarantees and warranties initiated during the contract period.

b. Insulation: Provide conductors with insulation rated for 600 volts. Insulation type THW, XHHW, or THWN with minimum temperature rating of 75 C wet or dry. Type THHN may be used in dry, above grade locations only.

c. Solid Conductors: Conductors No. 10 and smaller shall be solid copper.

d. Stranded Conductors: Conductors No. 8 and larger shall be stranded copper.

e. Conductors in Light Fixtures: Provide type THHN conductors, 90 degrees C dry for branch circuit conductors in fixtures UL approved for end-to-end assembly and for connection to recessed or surface-mounted fixtures. Conform with code for fixture wiring and for wet or dry locations.

f. Twisted Shielded Pairs, Signal and Communication Conductors.

1. 16 AWG stranded tinned copper conductors, twisted pair, FEP insulation, overall 100% shield, tinned copper drain wire.
2. FEP Teflon jacket for water resistance.
3. One pair, #16 AWG, stranded, tinned copper.
4. FEP – Fluorinated Ethylene Propylene insulation
5. 100% Beldfoil aluminum foil tape shield.
6. Shield drain wire.
7. Outer Jacket: FEP Teflon, 0.014 inches.
8. NEC CMP rated.
9. Water and oil resistant
10. Plenum rated
11. Maximum voltage: 300 V RMS

g. Signaling and Communication Conductors: Provide as specified in appropriate section.

h. Aluminum Conductors: **Aluminum is not acceptable**. Conductors shall be copper unless specifically noted otherwise.

i. Conductor Size: Provide No. 12 AWG copper wire or larger for lighting and power. Provide No. 14 AWG copper or larger for control circuits unless otherwise specified or required. Provide conductors of an ampacity equal to or greater than the over-current protective device rating. No more than one homerun (three phase conductors, one neutral, and one ground conductor) shall be installed in any conduit run, unless specifically shown on the plans. If more than one homerun is shown in a conduit run, the conductors shall be derated and increased in size as required by the NEC. Do not parallel conductors smaller than No. 1/0 AWG.

j. Exterior Feeders: Provide type THW conductors for service entrance conductors and exterior lighting and power circuits.

B. EXECUTION

1. Conductor Installation: Install conductors in conduit sized in accordance with code. Install all conductors in a raceway at one time, insuring that conductors do not cross one another or kink while being pulled. Lubricants for wire pulling shall conform to UL requirements for the insulation and raceway material.
2. Conductor Installation: Homerun circuits to panels shall be limited to a maximum of three circuits for three phase systems, and two circuits for single phase systems. For example, a homerun to a three phase panel shall be limited to three phase conductors (separate phases), one neutral, and one equipment grounding conductor. There shall be no exceptions.
3. Splices, Taps, Terminations:
    a. No splices are permitted in either service or feeder conductors. No splices or taps are permitted in branch circuits except at outlets or accessible junction boxes.
    b. Splices and taps for conductors No. 8 and larger shall be insulated using Thomas and Betts heat shrink insulated sleeves with sealant, heat shrink insulated boots with sealant, or preformed H-tap insulating covers.
    c. Splices and taps for conductors No. 10 and smaller shall be made with pre-insulated connectors 3M “Scotchlock” or Ideal “Wing Nut.”
    d. Provide solderless lugs or forked and flanged connectors for all power and control conductors that terminate on equipment or terminal strips.

16130 – BOXES

A. PRODUCTS

1. Boxes (FS or FD): Boxes used with RGS or IMC conduit (surface mounted or exposed) shall be Crouse-Hinds type FS or FD cast iron alloy. Hubs are to be threaded. Provide with cast cover and neoprene gasket.
2. Pull Boxes: Pull boxes shall be similar to the boxes listed above, for the conduit types listed. Boxes shall be sized per code or as shown. Provide removable cover on the largest access side of the box.
3. Box Size: Minimum box size shall be as required by the NEC
4. Pull-Boxes, Underground: Boxes installed underground shall be either pre-cast concrete, cast iron, "Quazite" composite, or as detailed on the drawings. Minimum size to be 12" x 24" x 18" deep, or larger as required by NEC. Provide locking cover with ELECTRIC logo.
5. Mounting Heights (From finished floor to center of outlet):
   a. General wall switches – 4'0" unless otherwise noted.
   b. Convenience outlets in Industrial spaces – 48"
   c. Special system devices – as required and/or as noted on drawings.

B. EXECUTION

1. Coordinate installation with other trades.
2. All junction and pull boxes must be accessible as required by code. Where junction boxes are installed in inaccessible locations, the electrical contractor shall provide and install access doors
3. Rigidly mount all boxes; make sure they are straight, level, plumb, and flush with finished surfaces. Use box extensions where box is set too deep. Plug open holes in boxes with suitable blanking devices. Do not use back-to-back or through-the-wall boxes.
4. Boxes for special systems – as required and/or as noted on drawings.
5. Where exposed in finished spaces, junction boxes shall have blank covers matching switch plates.
6. Install pull boxes in locations that will be accessible after completion of the building or project. Provide pull boxes or junction boxes to limit bends to the equivalent of 360 degrees. Provide Pull Boxes as required by distance limitations of the circuits installed. Additional pull boxes may be provided to facilitate wire pulling.

16140 – WIRING DEVICES

A. PRODUCTS

1. Line Voltage Wiring Devices: Provide wiring devices indicated. Bryant devices are specified to established minimum quality and general requirements. Comparable devices manufactured by Leviton, G.E., Arrow Hart, Pass & Seymore, or Hubbell may be provided. All similar devices shall be of one manufacturer.
   a. Switches: Provide specification grade heavy-duty flush tumbler switches. Color to be ivory. Switches shall be 120/277V, 20 amp rated. Inductive load rating shall be a full 20 amps. Switches shall be side- or back-wired, quiet action type.

Single Pole Single Throw	4901-I
Double Pole	4902-I
Three Way	4903-I

      1. Where switch with pilot light is shown, provide 4901-PLR120 switch with 120V or 277V pilot light. “Switch on – Light On”.
   b. Receptacles: Provide specification grade, heavy-duty, self-grounding type, ivory, for side- and back-wiring.
      1. Duplex 20 amp, 125 volt, Nema 5-20R 5362-I
      2. Duplex 20 amp, 125 volt, GFI GFR53FT-I

      Each receptacle shown to have GFI protection shall be a separate GFI device. Feed through protection from an upstream device is not an acceptable means of providing GF protection.
   c) Plates for Line Voltage Devices:
      1. Cast device covers used with type FS or FD boxes are to be Crouse-Hinds type DS. For indoor, non-WP applications.
      2. Weatherproof receptacle covers used with type FS or FD boxes are to be Crouse-Hinds type WLRS or WLRD.
      3. Weatherproof switch covers used with type FS or FD boxes are to be Crouse-Hinds type DS181.
2. Photoelectric Cell and Time Clock
   a. Provide photoelectric cell or time clock where shown for control of exterior lighting. Model shall be as specified, with adjustable operating levels. Provide Product of Tork.

B. EXECUTION

1. Wiring Devices
   a. Install all wiring devices indicated, complete with cover plate.
   b. Outlets installed on circuits supplying more than one device to be connected with a pigtail and “Scotchlock” connector to neutral so that removal of outlet will not disrupt continuity for branch circuit neutral. A like connection to be made to the equipment ground wire
   c. Contractor is responsible for pulling separate neutrals for GFI breakers whether or not the separate neutrals are shown on plans.
3. Photoelectric Switch and Time Clock
   a. Provide where shown. Orient photocell to aim north.

16150 – MOTOR CONTROL DEVICES

A. PRODUCTS
   1. General
      a. Motors: Equipment with factory mounted motors shall be set in place by the trade furnishing the equipment and motors.
      b. Control Devices: Control devices such as thermostats, etc., and wiring from each device to the motor starter shall be included in the mechanical work unless indicated otherwise.
      c. Motor Controls: Provide power wiring, motor connections, disconnects, starters with accessories, and support required for the safe and satisfactory control of all motors as required by code.
   2. Motor Starters - Square D starters are specified to establish quality and general requirements. Comparable starters manufactured by Siemens or GE may be provided. Provide magnetic starters for all three-phase motors except as indicated otherwise. Provide manual starters for all single-phase motors except as indicated otherwise. Provide starters in individual enclosure or combination type with disconnect devices, as indicated. Enclosures installed Outdoors shall be NEMA 3R rain-tight.
      a. Manual Starters
         1) Provide toggle type starter with thermal overload protection and red pilot light, class 2510, single-speed. Provide with Hand-Auto switch where indicated.
      b. Magnetic Starters
         1) Provide Class 8539 FVNR Combination magnetic motor starters with the following features:
            (a) Thermal overload protection sized to motor amps.
            (b) Red “on” LED pilot light.
            (c) 120 volt coils.
            (d) Fused control circuit, with disconnect switch, fed from integral control transformer.
            (e) Minimum of 3 aux N.O. contacts, and 3 aux N.C. contacts, field convertible, or as scheduled.
            (f) HOA switch except where indicated otherwise.
            (g) Manual reset button.
            (h) Main Circuit Breaker Disconnect.

B. EXECUTION
   1. General
      a. Provide starters and control centers where shown.

C. COORDINATION
   1. Coordinate with the mechanical installation all details pertaining to the motor control equipment, including but not limited to, motor size, starter coil voltage ratings, mechanical control device voltage and amp ratings, and control devices such as momentary contact versus maintained contact.

D. CONTROL WIRING
   1. Provide starter interlocking wiring as indicated. Provide terminals for connection of all wires.

16170 - FUSES

A. PRODUCTS

1. General
   a. Provide fuses at all locations shown on the drawings and as required for supplemental protection.
   b. Buss fuses are specified. All main, feeder, and motor fuses shall be as specified. Shop drawings shall include fuse types, sizes, and where used, provide time-current characteristics for all fuses to be provided.
2. Fuses
   a. Main and Feeder Protection: For protective devices 601 amps and greater at all voltages below 600 volts, provide UL Class L fuses, Type KRP-C Hi Cap, current limited. For protective devices 600 amps and below at all voltages below 250 volts, provide UL Class RK-1 rejection fuses, Type LPN-RK, low peak dual element, or Type LPS-RK over 240 volt. All main and feeder fuses to have 200,000 amp interrupting capacity symmetrical.
   b. Fuse Label: Provide instruction labels for all fuses installed, indicating type, size, voltage, and description.
   c. Fuse Clips: Where NEC class fuses are installed, fuse blocks and clips shall be designed to only accept fuses of the particular size and type specified. Fuse clips shall reject improper fuses.

A. EXECUTION

1. Spare Fuses (HIGH VOLTAGE AND LOW VOLTAGE)
   a. Furnish spare fuses of quantity equal to 20 percent of the number of each size installed, but not fewer than three of each size.
2. Motor Protections
   a. Where fuses feeding motors are indicated but not sized, coordinate the fuse size with the motor installed using Bussmans Motor Protection guide.
3. Fuse Label
   a. Mount fuse labels permanently on the device enclosures.

16420 – OUTSIDE UNDERGROUND WORK

A. PRODUCTS
   1. Conduit
      a. Conduit type used shall be as specified in Conduit and Raceway Section of Specifications.

B. EXECUTION
   1. Excavation and Trenching
      a. Excavation and trenches for underground systems shall be excavated at least 4" below required depth. Fill bottom of trench with clean, crushed gravel or sand. After installation, fill side voids and up 4" over conduit with clean, crushed gravel or sand. **Compact soil of backfill to original density to avoid settling. See Civil Drawings additional compaction requirements. Proper Compaction is critical at this site, and strict compliance with compaction requirements will enforced.**
   2. Sodding of Grass
      a. Strip grass with a sod cutter in area of trenching, and after excavation and backfill replace sod to original condition. If existing sod is damaged, replace with new comparable sod.
   3. Asphalt
      a. Saw cut asphalt as required and replace asphalt after excavation and backfill to its original condition with no settling or rough edges.
   4. Curbs and Sidewalks
      a. Curbs and sidewalks which are saw cut or broken out shall be replaced with new concrete to match existing original conditions. Provide expansion joints between new and existing concrete.
   5. Site Visitation
      a. It is recommended Contractor visit site and verify all conditions and dimensions before bidding.
   6. Utilities
      a. Contractor shall verify all existing utilities before excavation and take all precautions to protect same. Any utilities the Contractor breaks or ruptures shall be repaired at Contractor's expense, and any related costs due to outage shall also be paid by Contractor.

16430 – ELECTRICAL SERVICE

A. PRODUCTS
   1. General
      a. The new and modified electrical services shall be as shown on the Electrical One-Line Diagrams
      b. All utility company costs for their related work will be billed direct to the Owner, do not include in bid price.
      c. Contractor is responsible for coordinating and scheduling all Electrical Utility Company work related to this project. Contractor is responsible for fully and completely scheduling and coordinating all electrical utility company work.
      d. The Service Voltage shall be shown on the One-Line Diagrams.
   2. Grounding
      a. Provide grounding rods, service grounds, and copper conductors.

B. EXECUTION
   1. General
      a. All work shall be in accordance with the power company's standards and subject to their approval. Carefully Coordinate the installation of service entrance equipment, and all service details with the Electric Utility prior to the beginning of construction. Comply with all Electric Utility Company standards, regulations, rules, and requirements

16450 – GROUNDING SYSTEM

A. PRODUCTS
   1. Provide all conductors, ground rods, raceways, grounding busses, lugs, jumpers, clamps, and other required devices for the grounding system.

A. EXECUTION
   1. General
      a. Ground all electrical systems completely and effectively as required by code and as specified. Provide all ground systems and make connections mechanically secure and electrically continuous.
   2. Service Entrance Ground
      a. Connect the incoming electrical service neutral conductor(s) to the neutral bus in the main distribution panel. Connect the MDP neutral bus to the MDP ground bus, and ground the MDP ground bus to the building ground electrode. Building ground electrode shall consist of grounding as required by Section 250-81 of the NEC whether shown on plans or not shown on plans.
      b. Clean the contact surfaces at all ground connections.
   3. Raceways Systems
      a. Install metallic raceways mechanically and electrically secure at all joints and at all boxes, cabinets, fittings, and equipment. At the point of electrical service entrance, bond all metallic raceways together, with a ground conductor, and connect to the system ground bus. Bond all boxes as specified for equipment.

b. A separate green equipment-grounding conductor shall be installed in every raceway, including all metallic raceways. Continuity of metallic raceways shall not be solely relied upon for grounding. A separate equipment-grounding conductor shall be installed in every raceway.

4. Light Fixtures
   a. Provide separate green ground wire conductor in all conduit to light fixtures, switches, and associated branch circuits. Ground all intermediate enclosures, boxes, equipment, fixtures, etc. Use same size ground conductors as phase conductors.
5. Equipment
   a. Provide separate green wire equipment ground conductor in all nonmetallic electrical raceways and metallic raceways to effectively ground equipment and enclosures. Green wire equipment ground conductor shall be connected at all intermediate enclosures, boxes, equipment, fixtures, etc. Provide all required bonding jumpers, grounding bushings, lugs, busses, etc. Connect equipment grounds to the metallic raceway system. Use the same size equipment ground conductors as phase conductors, up through No. 10 AWG. Use NEC for conductor size with phase conductors No. 8 and larger if not shown.
6. Receptacles
   a. Provide separate green wire ground conductor to all receptacles.
   b. Connect the ground terminal on each receptacle to the independent continuous insulated ground conductor where provided with pigtail and “Scotchlock” so that removal of receptacle will not disrupt ground continuity.
7. Motors
   a. All motor connections shall have an internal insulated ground conductor in all conduits.
   b. Connect the ground conductor to the metal frame with a bolted solderless lug. Bolts, screws, and washers shall be bronze.
8. Ground Bushings
   a) Install ground bushings with a wire to ground bus on any conduits coming up through slab in pad mount transformer and MDP. Also install ground bushings on any conduits 1¼” or larger.

16460 – DRY TYPE TRANSFORMERS

A. PRODUCTS
   1. Transformers
      a. Transformers shall be Square D Sorgel dry type, totally enclosed and ventilated, 80 deg C. rise insulation, and with maximum sound levels of 45 DB through 150 KVA and 50 DB through 300 KVA.
      b. Equivalent products of Siemens and GE are acceptable.
      c. Size, type, style, ratings, and connection as noted on drawings.

B. EXECUTION
   1. Install at locations noted in strict accord with manufacturer's recommendations. All units shall be mounted using vibration insulators. Use suspension rods, wall brackets, or floor supports as required. Isolate from structure in all cases.
   2. Make all connections using flexible conduit at transformer, minimum length of 18".
   3. Install a minimum of 6" away from any wall, or further if recommended by manufacturer.
   4. Run ground wire through flexible conduit to maintain positive ground continuity with conduit ground.
   5. Any noisy units shall have the installation revised to achieve an acceptable sound level or replace with a new unit with an acceptable sound level.
   6. Ground all transformers as required by Section 250-81 of the National Electrical Code whether shown on plans or not shown on plans.

16470 – PANELBOARDS AND DISTRIBUTION GEAR

A. PRODUCTS

1. General
   a. Square D equipment is specified to establish minimum quality and general requirements. Comparable equipment manufactured by Siemens or General Electric may be provided.
2. Branch Circuit Panels - Provide Type NEHB or NQOD panel boards as required with bolt-on breakers with interrupting capacity as shown on the panel schedules. Box dimensions to be nominally 22" wide by 5 ¾" deep. Provide ground bus in each panel. Panel bussing shall be copper.
   a. Cabinets: Provide zinc-coated, zinc-steel cabinets conforming to UL requirements, bearing UL inspection label. Provide primer coat and finish coat of manufacturer's standard color on all cabinet surfaces, trim, and doors. Provide NEMA 1 enclosure unless otherwise specified. Provide doors with concealed trim clamps, flush lock, and master keyed. Provide two keys for each panel board. Mount a directory holder with clear plastic cover and metal frame on the inside of each door. Install a typewritten directory, properly identifying each circuit and the specific load served.
   b. Circuit Breakers:
      (1) Provide factory-installed, molded case circuit breakers conforming to Fed. Spec. WC-3758 and the following:
         (a) Thermal magnetic trip units, trip-free, trip-indicating.
         (b) Quick-make, quick-break contacts with interrupting capacity equal to or greater than indicated.
         (c) Common internal trip for all 2- or 3- pole breakers.
         (d) Panels and circuit breakers shall be fully rated for the AIC value indicated. Series rated systems or breakers are not permitted.
      (2) Special Features: Provide subfeed lugs, shunttrip, or any specialty called out on plans or schedules. Tandem or half-sized circuit breakers are not permitted.
3. Main Distribution Boards
   a. The main distribution boards shall be Square D I-line with interrupting capacity as shown on the panel schedules. Bussing shall be copper. Box dimensions to be nominally 32" wide by 8¼" deep minimum. Provide ground bus in panel. Breakers shall be bolt-on type with same characteristics as listed under branch circuit panels. Breakers and system shall be fully rated for the AIC values shown, series rated systems are not permitted. Breakers as shown in panel schedules must be mounted opposite each other and side by side as shown. Numbering and layout must be per plans.

4. Safety Switches
    a. Provide disconnects as noted. Disconnect switches for 120 volt motors or equipment shall be toggle type manual motor starters with overload protection in NEMA 1 enclosure or as required or called out on plans.
    b. Disconnect switches for two-pole and three-pole loads shall be Square D heavy-duty type in NEMA 1 enclosure, fused type, voltage rating as required.
    c. All disconnect switches installed exterior to the building to be installed in NEMA 3R enclosures, or as called out on plans.

B. EXECUTION

1. Support
    a. Properly align distribution boards, panel boards, and safety switches and adequately support independent of the connecting raceways. Provide all steel shapes and appurtenance necessary for the support of the equipment.
2. Protection
    a. Where distribution boards, panel boards, or disconnects are installed during construction, place temporary covers over the openings or enclosure at all times, except when work is being performed.
3. Conductor Terminations
    a. Coordinate lug types and sizes and wiring space with termination requirements of conductors to be provided.
4. Circuit Numbering
    a. All circuits shall be run and numbered to agree with drawings. All panel layouts shall match drawings.
5. Conductor Installation.
    a. In no case shall circuits from one panel be routed through the cabinet of another panel. The intent is to prevent one panel from being used as a raceway for circuits from a different panel. <u>There shall be no exceptions.</u>
6. Ground Bushings
    a. Install ground bushings on all conduits entering main switchboard and tie to ground bus.
7. Testing
    a. Any tests required by local or state officials shall be performed by a factory representative of the equipment and all associated costs borne by the electrical contractor.

16510 – LIGHTING FIXTURES

A. PRODUCTS
   1. General
      a. The fixtures listed on the drawings indicate manufacturer, fixture design, appearance, and performance desired. Listed catalog numbers shall not be considered to specify all requirements. These fixtures shall be modified, if necessary, to comply with the subsequent specification. Fixtures shall be complete in all respects.
      b. All lighting fixtures must bear UL labels.
      c. Fixture component parts shall be manufactured and/or assembled at the manufacturing plant for shipment in one or more packages.
   2. HID Fixtures
      a. Provide HID fixtures, complete with mounting hardware and ballast.
      b. Provide single lamp, HPF, constant wattage type ballasts unless otherwise specified. Ballasts shall be suitable for 150 degrees F. for interior applications and –20 degrees F. outside. Indoor ballasts shall have the lowest sound level rating available.
   3. Lamps
      a. Provide lamps manufactured by General Electric, Westinghouse, or Sylvania. Lamps must be compatible with ballasts furnished.
      b. HID Lamps: Provide lamps of the size, type, and color scheduled. All lamps phosphor coated unless specifically noted otherwise.
   4. Special Accessories
      a. Provide all accessories, such as plaster frames, t-bar hangers, swivels, stems, canopies, brackets, adapters, and cords necessary to mount all fixtures in a proper and approved method, both structurally and for appearance.

B. EXECUTION
   1. Standard Plaster Frames
      a. Provide plaster frames if required for all recessed lighting fixtures installed in plaster or drywall ceilings.
   2. Supports
      a. Properly support and align fixtures and provide all necessary steel shapes for support. Coordinate complete fixture installation with the building construction.
   3. Common Details
      a. Square and rectangular fixtures shall be mounted with sides parallel to building lines, and parallel with ceiling lines.
   4 Exterior Pole-Mounted Fixtures
      a. Provide all necessary hardware and material for a complete installation capable of withstanding 100 mile per hour winds, with a 1.3 gust factor.
      b. Where concrete pole bases are indicated, provide concrete in compliance with the appropriate section of the general portion of the specifications.